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PAPERS

READ AT

The Royal Institute of British Architects,

SESSION 1862-63.

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TABLE OF CONTENTS.

TITLE.	AUTHOR.	DATE.	PAGE.
Opening Address	The President, W. Tite, M.P.	Nov. 3rd, 1862.	1 — 9
Memoir of Monsieur Charles Frederick Nepveu, Architect, of Versailles.	Professor Donaldson, Ph. D. Fellow.	„ „	10 — 14
Some Researches on Color and Colored Decoration, with Illustrations.	T. Hayter Lewis, Fellow . .	Nov. 17th, „	15 — 31
The Restoration of St. Michael Penkevel, Cornwall, with Illustrations.	G. E. Street, Fellow . . .	Dec. 1st, „	32 — 53
Some Remarks on Hungerford Market (just removed to make room for the Charing Cross Railway Station.)	C. Fowler, Fellow	Dec. 15th, „	54 — 57
On the Conventual Arrangement of Canterbury, with Illustrations.	The Rev. Mackenzie E. C. Walcott, M.A., F.S.A., &c.	„ „	58 — 76
Sundry Sanitary Building Appliances, with Illustrations.	John Taylor, Jun., Esq., M.A., F.S.A.	Jan. 12th, 1863	77 — 98
On the Abbey Churches at Caen, with Illustrations.	J. H. Parker, Esq., F.S.A., Hon. Member.	Jan. 26th, „	99 —126
A Discussion upon the Practical Ventilation of Buildings.	....	Feb. 7th, „	127 —139
On Artificial Stone	Professor Kerr	Feb. 23rd, „	141 —159
A Discussion upon the Practical Ventilation of Buildings, *continued.*	....	March 2nd, „	161 —174
On certain Analogies between Architecture and the other Fine Arts.	The Rev. W. Whewell, D.D., F.R.S., &c. &c.	March 9th, „	175 —189

TITLE.	AUTHOR.	DATE.	PAGE.
On the Abbeys of Ireland, with Illustrations.	The Rev. J. L. Petit, M.A., F.S.A., Hon. Mem.	Mar. 23rd, 1863	190 —208
On the Photographs of the Sculptures of Wells Cathedral, issued by the Architectural Photographic Society.	William Lightly, Associate.	April 20th, ,,	209 —212
The Crypt and Chapter House of Worcester Cathedral, with Illustrations.	The Rev. R. Willis, M.A., F.R.S., Hon. Member.	,, ,,	213 —230
Note sur la Ville de Perga en Pamphylie, Asie Mineure, with Illustrations.	M. Charles Texier, of Paris.	May 18th, ,,	231 —234
Perga.—Topographie de la Ville, with an Illustration.	M. Chas. Texier, Hon. Fellow	,, ,,	234A—234E
Heads placed over Arches	Sir Gardner Wilkinson, F.R.S., Hon. Mem.	,, ,,	235 —239
A Few Notes on some Polychromatic Construction at Aston Church.	M. E. Hadfield, Fellow . .	,, ,,	240 —241
Description of the Tribunal de Commerce, now erecting by Mons. Bailly, Architecte, at Paris.	T. L. Donaldson, President .	,, ,,	241 —242
On the Principles to be observed, and the Processes employed, in the Decoration of Churches.	William Lightly, Associate .	June 1st, ,,	243 —260
The Stereochromic and other Technical Processes of Painting considered with reference to their employment in Mural Decoration	Thomas Purdie, Contributing Visitor.	June 15th, ,,	261 —282

OPENING ADDRESS BY THE PRESIDENT,

At the Ordinary General Meeting of The Royal Institute of British Architects, November 3rd, 1862.

GENTLEMEN,—In obedience to that which has now become our regular custom, it is my duty as your President to address you on this our First Meeting for the Session of 1862-3. And I have the more pleasure in doing so, because I think the Institute has never exhibited so satisfactory an appearance, whether we regard its influence in society and in the scientific world, the increasing number of its members, or the prosperous state of our funds.

Notwithstanding, however, this satisfactory condition of our affairs, the events which I shall have to bring under your consideration must be prefaced by a notice of the melancholy bereavement the Nation *generally*, and *The Institute of Architects particularly*, have to deplore in the premature death of one of our distinguished patrons, in the person of the Prince Consort.

At the time when that event happened, we endeavoured to offer to Her Gracious Majesty the Queen, our humble though affectionate Condolences; but I must still be permitted to add a few words on this melancholy subject.

His Royal Highness The Prince Consort earned, in the course of his short, but eminently useful, career, the gratitude and esteem of all who are directly or indirectly connected with the development of a taste for the Fine Arts in our Fatherland. It is not for us, feeling bitterly as we still do the loss of a kind Patron, and an earnest lover of our profession, to inquire curiously into the peculiar tastes, or the æsthetical theories adopted by His late Royal Highness in matters connected with Architecture; because, emphatically, these are questions beyond the reach of abstract reasoning, and because the manner of their solution depends greatly upon these early associations which modify the faculties required to be brought into action in our perceptions of The True, The Good, or The Beautiful. We may, thus, entertain, Individually, opinions with regard to Objects of Art different from those which guided the late Prince in his preference for certain Architectural forms: but after every allowance may have been made on this score, the conviction must still remain that His late Royal Highness *actually did more to promote the love of Pure Art*, and for the sake of Art, than any of his predecessors, however they might be placed in those positions which enable men to adopt or to express the modes of thought of their Contemporaries. On occasions of the public expression of regret for the loss of one so good and great, it is, perhaps, undesirable to suggest comparisons of any description, because they are apt to disturb the unanimity of feeling which it is so desirable to retain: but I cannot refrain from remarking that *one of the many amiable and intelligent characteristics* of the action of His late Royal Highness in his Patronage of Art, always seemed to me to be especially worthy of admiration;—namely—His respect for Personal character and independence of judgment, on the part of those "whom He delighted to honour." He loved Art for Art's sake; and not for the sake of imposing his own views or opinions on its external manifestations. His loss has been indeed a heavy blow to English Art in all its branches. I am inclined to think that our estimation of the good which he has done, and the best proof of our regret for his premature removal from amongst us, would be most satisfactorily shown, by our endeavouring to carry forward, so far as lies in our power, the task he set to himself: namely, that of improving the general tone, and of diffusing the universal Love of Art. So He laboured; and so shall we most effectually retain his spirit, and advance his work!

The next important event to which I propose to call your attention is the one the Departed Prince had himself zealously laboured to prepare during his lifetime, and which will always be connected with his name in the nation's recollections; I mean the Great International Exhibition. When they are rightly understood, and properly managed, these periodical gatherings of the products of Art and Manufacture from All Quarters of the Globe, must be the most efficient means of advancing the attainment of that "Peace on earth, and good will towards men," which we believe to be the end of all social organisation. And though the bright visions in which men began to indulge, on the occasion of the Inauguration of the First Great gathering of this description, have been rudely shaken by the sad events now taking place in America—it is still morally certain, that the *more Nations learn to Appreciate the Merits and Powers of each other*, the less likely are misunderstandings to arise among them.

With respect to the Building erected for the purposes of this Exhibition, it will be most becoming for Architects to observe silence on the subject of its artistic qualities; though we certainly may record our protest against its being in any manner considered as any representative of the Architectural Taste of our Age and Times. It was unfortunate that a Gentleman, whose studies and pursuits had not been of a nature to develope the artistic faculties required for the successful cultivation of our Profession, should have been selected to design and execute a structure necessarily intended to illustrate before the Assembled Nations the actual state of Architecture amongst Englishmen. The very merits of the construction do but point the moral of this objection, because they are of a nature to indicate that the designer had solely directed his attention to the scientific and technical details of the problem submitted to him, without being able to grasp its Æsthetical or Moral signification. We thus find, that the *goods* are exhibited in a shed, tolerably lighted: that the Pictures and Sculpture are also placed in rooms where they can be seen, speaking generally, in a very advantageous manner; and indeed the Picture Galleries are the most successful parts of the building: however I may be disposed to abate from the reputation of originality and merit assigned to them by official critics. But there is an absence of Artistic treatment in the Plan of the Building; and to such an extent is this the case, that even the proper arrangement of the articles exposed has suffered from their bad distribution; whilst the general elevation and the ornamental details of the exterior particularly are very objectionable. No *Architect* could have designed a work so unsatisfactory had he but studied the rudiments of his profession, and yet British Architects are unhappily represented to assembled Europe by this eminently Unarchitectural edifice! Even the Crystal Palace of 1851 could boast of merits superior to those of its successor, and it gave signs of the existence of a desire on the part of artists, and of the public, to seek some new mode of expressing the peculiar feelings and wants of the age. Compared with the Crystal Palace, the new International Exhibition Building has been a step backward rather than forward in art development; and, as such, it cannot be regarded as a fair exponent of the effects notoriously produced upon our profession by the great intellectual movements of late years.

It is a matter of extreme pain to me thus to feel obliged to criticise the labours of men who have laboured earnestly in the discharge of their duties; but, as your President, it is necessary to place on record the fact that BRITISH ARCHITECTS are in nowise responsible for the International Exhibition Building, and that they who would seek to trace the Progress of Architecture in England during the period between 1851 and 1862—*must turn to other quarters for the elements of comparison.*

In my Address of the last year, I pointed out what I believed to be the position of our Profession in Society; and I illustrated it by incidents which had occurred in the House of Commons, and by opinions expressed there, and received even with applause, though little complimentary to our attainments, or our scientific position. I cannot venture to think that my humble appeal would do much towards our advancement; but at the same time one circumstance has occurred of so eminently satisfactory a character, that I am sure I shall be pardoned in this place for calling particular attention to it. You will at once perceive that I allude to the invitation made to some of us, *as Architects*, to advise the very distinguished Committee appointed by Her Majesty on the subject of the intended Memorial to the Memory of the Prince Consort. This invitation also has one most flattering incident connected with it, that *the suggestion came from Her Majesty.* The advice which we ventured to give, I am happy to say, has been approved by the distinguished personages with whom we were placed in communication. It has given satisfaction in the highest quarters, and, notwithstanding some ungenerous, unjust, and individual criticism, it has been well received by the public. I hope, and I believe also, that our well known and able Colleagues, who are now anxiously engaged in the realisation of our suggestions will achieve the success which the Nation so anxiously desires.

With this gratifying fact before us, we may, I think, dismiss from our thoughts all further reference to the studied neglect of Architects by the Governmental Department connected with the Art Education of the Country. We may also equally forget and forgive the absurd and laboured attack of one of the officers of that department, who seemed not to remember that such Men as INIGO JONES and CHRISTOPHER WREN; CHAMBERS and SOANE; or SMIRKE and BARRY, had ever lived in England: that MICHEL ANGELO or BRAMANTE, VIGNOLA or PALLADIO, or countless others had flourished in Italy: that PERRAULT or PERRONET; HITTORFF or VISCONTI, had lived, or even *were living* in France: that KLENZE or SCHINKEL had ever flourished in Germany: or that he must have known Architects in *This Country* to whom his compatriots were not insensible as having their claims and merits acknowledged by the scientific world.

Before I pass from this subject I cannot but express my hope that the Profession to which I am very sincerely attached, and which I have now followed for more than Forty Years, may receive from me in a kindly spirit a few words of caution, that we ought not to forget that the great Principles of Art demand something more than a mere patient Reproduction of Forms eliminated in, and appropriate to other times, without sufficient reference to the great power given to us by new materials, demanding different treatment, and a new exertion of the imaginative faculty. I shall have occasion to say presently a few words on the subject of Art-Education amongst ourselves, and what the Institute desires to do to promote it. This is really a subject of great interest; because in other Countries, as, for instance, in France and Belgium, the State interferes actively to provide the Means of Art-Education for the mass of the Nation, under such conditions as to allow almost every one, who may desire it, to acquire sound and comprehensive opinions on Art-questions; and the Gratuitous Courses of Lectures, and the Industrial and Drawing Schools, are so brought, as it were, to the doors of the people in general, that they have, in the two instances cited, actually become *Nations of Artists.* There are many grave reasons for hesitation on our parts before we adopt the system of State-Intervention in these details of Education; and also for believing that no sound vital Art can be produced by such a forcing-process. But, nevertheless, the importance of addressing a sympathising and well-educated Public must be to the Artist so great, that we may well consider how far it might be desirable and possible for us, in our *private capacity*, to labour to diffuse more correct Principles of Taste than those which seem unfortunately now to prevail in our country. We need not seek to impose *our own views, but we may strive to Teach as well as to Learn.* We must always, however, bear in mind that we shall not be able to influence Public Opinion, *unless we are really and truly of our Own Times;* and are true exponents of the spirit and feelings of our age in all that is good and pure, without servile deference to fashion, or yielding in any way the rights of our own consciences to temporary popular fancies or errors; we ought, in fact, to endeavour to guide the opinions of our contemporaries in the formation of their Æsthetical principles, as applied to Architecture, in the direction of devotion to moral beauty and earnest truthfulness.

Much has been done of late towards the attainment of the great object referred to, by the labours of our respected friends Sydney Smirke and Gilbert Scott, and also by the authors of several excellent Papers read at our Meetings; but the audiences addressed on these occasions are limited, and the publicity given to this teaching does not extend to the majority of those whom it is so desirable to enlighten. It seems to me that one of the most powerful instruments for diffusing the knowledge which we are so much interested in imparting would be by establishing Courses of Lectures on subjects connected with our Art, written expressly in a popular and attractive style, and open, *if not quite gratuitously, at least, at a very low rate of payment, to all persons connected directly, or indirectly, with the Building Trades.* The object we have to aim at is, as it were, to produce an atmosphere of Art-feeling, and this can be attained only by making Art familiar and popular, and by raising the taste of all around us. And moreover, *we, as Architects, have a direct interest in advancing the Art-Education of the classes who really carry out our designs, in order to ensure their being executed in the spirit in which they were conceived.* It is precisely in the want of Artistic feeling, and of true knowledge of the ends and objects of their pursuits, that our artisans are inferior to those of the Continent; and I hold it to be our duty to strive to remove this obstacle to our Art-progress; at the same time that we diffuse the Taste for Architecture amongst the general public, by placing within the reach of those who may wish to learn, the means of forming correct opinions on the subject. Of course it is difficult to organise any such system of Public Education, and to give it a permanent character. The history of the Mechanics' Institutions proves that good intentions are not alone sufficient for the purpose; but a firm faith in the soundness of any course of proceeding, almost inevitably leads to the discovery of the means for attaining it. "Where there is a will, there is a way," and surely there can be no greater difficulty in organising some form of gratuitous Art-Education at the present day, than there was formerly in organising the Grammar-schools, and those Municipal Corporations, to which many of the functions of educational boards upon technical matters were entrusted. Our own Institution might do much to popularise the Knowledge of Architecture; and in this very building other Societies periodically meet, which might render efficient service in the cause.

The discussion of the Present and of the probable Future state of English Architectural Education, would certainly lead me too far, were I to pursue it to even its legitimate limits, and indeed I fear it has carried me somewhat beyond the space allowable in an Inaugural Discourse. Its vital importance to our Profession must be my excuse, and most sincerely do I hope that the ideas I have expressed may induce more able intellects than mine to ponder over its difficulties. At present, however, I return to the consideration of contemporary events, and resume our cursory view of their nature and tendency.

On all sides we find that the fashion for Municipal Alterations, set by our neighbours, is being followed, with more or less enthusiasm; and the various Scientific Journals prove that such Towns as Brussels, the Hague, Berlin, Vienna, etc., are undergoing a species of transformation, though on a different scale, analogous to that lately carried out in Paris. In London, also, we have entered upon the same course, and under the guidance of the Metropolitan Board of Works, of the Corporation of London, and of the various Railway Companies, very great changes are in progress, or are at least in contemplation, under such conditions as to justify the belief that they will soon pass into the class of facts. The most important of the recent undertakings thus referred to, is unquestionably the Embankment of the North Side of the Thames; and most earnestly do I hope that this work may be carried to its conclusion in such a manner as to add to the salubrity, the convenience, and the ornamental character of our Metropolis. Differences of opinion have occurred with respect to the *manner and to the extent* in which this work should be carried out; and, unfortunately, hard words have been bandied about by men who ought to have had better taste than to abuse those who happened to differ from them on matters of detail. The Legislature has, however, wisely and happily passed a law which settles these disputes, and all parties must now labour to carry out successfully the measure so adopted. It is, nevertheless, but a small instalment of that which is required to be done to the Thames in the interest of the Navigation, quite as much as in the interest of the Embellishment of the City. Unfortunately, we, as a Nation, priding ourselves as we do on our practical character, are indisposed to treat general subjects in a very comprehensive manner: and thus it is to be feared that we may deal with the Embankment of the Thames, which was proposed Two Centuries ago,—in the same piecemeal spirit which has produced the partial embankments at the Isle of Dogs, at the Houses of Parliament, and at Pimlico and Chelsea: whilst it opposes the establishment of stable conditions of the bed and of the currents of the River. It is a great thing, nevertheless, resolutely to have commenced on the Embankment of the North side of the River; and there to have sought the means of partially relieving our overcrowded streets. Time will compel the execution of the complete scheme.

And here it may be appropriate to notice the various New Bridges erected over the River; because not only are they amongst the most striking monuments of the day, but also because they seem to me "to point the moral" of the inconvenience before referred to, resulting from the separation of the Professions of Architecture and of Civil-Engineering. I do not propose to discuss the methods of construction adopted in these Bridges, though much might be said on that subject; but, as an Architect, I cannot refrain from the expression of regret that their designers had not studied more carefully the laws of optical effect, or the logical application of archæological forms. The parallel vertical cylinders, and the parallel horizontal girders, of the Hungerford Bridge, produce a combination of lines which must be declared to be very ugly; and the Street-girder Bridges are, if possible, worse. A study of Mr. Penrose's researches upon the Parthenon, would have saved the designer of the Hungerford Bridge from the optical mistakes, if I may use that phrase, into which he has fallen; and a careful study of the effects produced by the various forms of elliptical arches, in combination with long *quasi* horizontal lines, would have taught the very able engineer of Westminster Bridge, that very flat ellipses under such circumstances always appear to deflect over the crown. For my own part, I may add, that it seems difficult to carry out with any pretension to archæological correctness a design for an Iron Bridge with flat elliptical arches in the later mediæval style as practised in England; because the material employed is not susceptible of the deep splaying of the outline of the arches which is the essential characteristic of all good mediæval arched work. The style adopted in the New Westminster Bridge is, in fact, a mistake into which a properly educated Architect could not have fallen, and the great engineering merits of the work must render our regret for this artistic defect the more poignant: for, on the whole, this Bridge is one of the noblest monuments on the Thames. The Bridge leading to the Victoria Station is, as a work of art, in my opinion, more consistent than the Westminster one; and it is infinitely more elegant than the Lambeth Suspension Bridge; the latter, indeed, is so unredeemably ugly, that I am almost tempted to regret that there should not be a Committee of Taste to which the designs for Public Works should be submitted. Blackfriars Bridge, I may also notice, will soon cease to exist. As is well known, it was the work of one of our best Architects, the elder Mylne, and it was celebrated not only in this country but in Europe, as of surpassing elegance and beauty. In the competition which has raged for some months past as to the designs for its successor, I cannot say I see much to admire in the result; for unfortunately, the very worst design of the whole has been chosen. Mr. Page's Three-arched bridge was a grand idea, though defective in detail. The Bridge about to be erected, is in five segmental arches of iron, with stone piers: and the architectural features of those piers, and other adornments, are highly objectionable. Before quitting this subject, I would beg to express my serious apprehensions of the present fashion for the use of Wrought-Iron, for Bridges connecting the leading thoroughfares in such a town as London. Our experience in the use of that material is not sufficient to justify its introduction in such positions, however justifiable it may be in the case of Railway Bridges, or of similarly speculative undertakings.

Street-Improvements have not kept pace in London with those in course of execution in Paris; but the changes of this description recently made here, have been of themselves sufficiently remarkable, and they furnish many valuable lessons to those who know how to read the signs of the times in the various phases of Architecture. When I had the honour of addressing you Last Year, I ventured to express my feelings of satisfaction and pride for the high character of the Art displayed in the new Streets of the City; and on this occasion I can but repeat my congratulations to our professional brethren who have so successfully laboured to adorn the Metropolis. No doubt a severe critic might find many reasons for objecting to details of the new and gorgeous piles of warehouses and offices lately erected in our great streets; but I still contend, that, considered comprehensively, those buildings display sound taste, keen perception of Architectural beauty, fine feeling for Art allied to common sense, and a sufficient amount of originality to justify us in entertaining confident hopes for the future prospects of our Profession, notwithstanding all the defects previously alluded to in our publicly recognised Art-teaching. Possibly the superior character of the buildings lately erected in the City may be attributable to the fact that they have escaped, to some extent, the influence of fashion and of official pedantry: at any rate, the contrast between the Architecture of the new City Streets, and that of the buildings erected under the influence of the Science and Art Department of our Government, is so marked, that the question of the necessity for the existence of the latter expensive organisation is almost forced upon our attention. Again, we learn that public opinion is a better guide, a more sure fosterer of genius, than State Patronage can ever be; and the Street-Architecture of the principal English Provincial Towns fully confirms this opinion. I dwell a little upon this branch of the review of our recent progress, because it seems to me that we have done, and are doing more in Domestic Architecture, so to speak, than in our Public Buildings, in which the influence of Fashionable Art Theories has been allowed to over-ride the individuality of the artists themselves. The influence of these external conditions on the development of Architectural Taste is, however, a subject so vast, that I only allude to it now in passing, but with the hope that some of my hearers may return to its consideration hereafter. In the meantime it may be remarked, that in the provinces the last year has witnessed the commencement of some Town-Halls, and some reproductions of Mediæval Ecclesiastical Buildings of singular merit; which prove that at least the labours of the departed Prince, whom we began by regretting, have not been fruitless amongst us. You will forgive, Gentlemen, this return to the sad theme of the commencement of my Lecture. As we grow older, it becomes more difficult to replace those whom we have lost, and insensibly we find that the frame of mind the poet so well described comes over us—for then

> " Our hearts have one unceasing theme,
> " One strain that still comes o'er,
> " Their breathing chords as 'twere a dream
> " Of joy, that's felt no more!"

I am thus brought again to the record of our losses in the course of the last Twelve Months. We find the list of " Death's Doings " headed by the decease of M. Jean Baptiste Biot, who passed from this life on the 27th of January last, at the advanced age of nearly 88 years. He was a sincere lover of Science: his labours connected with the Egyptian Chronology were early crowned with success, and he attained well-merited distinction for his Identifying the Dates of the Egyptian and the Hindoo

Astronomies of that period. All Architects must be obliged for the light thus thrown upon the most abstruse branch of their studies. MATTHEW COTES WYATT passed away from us about the same time, for he died on the 24th January. Mr. Wyatt was a son of the late James Wyatt, Surveyor-General, and for a short time President of The Royal Academy, in which institution the son was educated. A series of works was entrusted to his care in Windsor Palace by George the Third, but his first appearance in public was by a Statue to Lord Nelson, erected at Liverpool. Since that time he executed the Cenotaph of the Princess Charlotte at Windsor; the Monument to the late Duchess of Rutland, at Belvoir Castle; the Equestrian Statues of the Duke of York, and of the Marquis of Anglesea; the Statue of George the Third, at Charing Cross; the great Statue of the Duke of Wellington, at Hyde Park Corner; and some smaller tombs and Works of Art. It will be advisable to allow these works to remain in the indifference to which they have sunk, for they do not exhibit the high principles of Art which now characterise our Sculpture; yet I would urge those who may seek to compare Wyatt with our times, to consider him with the tendencies of his age, and to compare his works with the false taste which then prevailed; and then Wyatt will very well bear the comparison. The next Member whom we have to regret is PROFESSOR PETER BARLOW, of the Academy of Woolwich, a person whom every Engineer and Architect must always hold in estimation. The researches of this gentleman on the Strength of Timber, and the best Form to be given to Railway-Bars, are amongst the most valued productions on the subject. But all his inquiries into the Qualities of Iron, must be considered as text-books on the various subjects investigated. Professor Barlow passed from us on the 1st of March last, aged about 83 years.

On the 2nd of April died Mr. JAMES ELMES, an author of eminence on Architectural Legislation. He was principally known by his work upon "Architectural Dilapidations," "The Life and Times of Sir C. Wren," a volume of "Lectures on Architecture," and some minor publications. Mr. Elmes also lived to a very great age. On the 9th of the same month, April, in his best days, and just as his fame was beginning to be established, JOHN THOMAS was snatched away from the future, which began to spread before him, and from the brilliant prospects which seemed to crown his labours. We have few instances upon record in our profession, of the fate of a man being so marked with the character of his genius, as was that of Mr. Thomas, and I think that we may congratulate ourselves upon the result of his labours. He was not highly educated; he was not a genius of a description to take the world by storm; but he was purely and simply a firm believer in the importance which Art should bear to Architecture. He was convinced that they could mutually throw light upon each other; and he laboured to make the two branches of Sculpture and Architecture, to which he had devoted his attention, combine to work out the end he had in view. His success was justified by his labours, and in Somerleyton House and in Arlesford Hall he had surpassed himself in the fancy of his design. I would urge you to think of Mr. Thomas's success. It seems to me to be fraught with lessons of deep importance to the Artists of future generations; and in proportion as *they* work in the spirit which he infused into his work, so will they merit the praise of posterity.

Happily this review will show that amongst the class of actual Architects our losses in this country have been few.

Amongst our neighbours in SCOTLAND, the losses have even been fewer, for I do not know that we to mention have any other than Mr. GEORGE HENDERSON, of Aberdeen; he was a good mediævalist, and erected some creditable specimens of his skill in the Counties on the East coast, especially at Aberdeen, Montrose, Burnt-Island, and Arbroath. He was a sensible restorer, and seems to have been in advance of his age in his love for the Mediæval Style.

In FRANCE I am called upon to notice three deaths: namely, M. NEPVEU, Architect, of Versailles;

M. Havély, and M. Brunet De Baines. The first of these I leave in the able hands of my Friend Professor Donaldson, who proposes to address to you a few words on his loss. M. Havély was the Secretary of The Académie des Beaux Arts; and his death is well deserving of our deep regret, as he was the exponent of the feelings of French educated society towards our profession; and, as he possessed, to a great extent, the feeling that all lovers of Art are equally entitled to consideration. The other gentleman claimed to be ranked amongst our Honorary Members by the great skill which he had displayed in the construction of the Museum of Havre, the Caserne des Douanes, l'Entrepôt des Tabacs, and finally the Hôtel de Ville of that town, and in the new buildings of the Hôtel des Invalides.

But though as Architects we have thus individually escaped, Death has left his mark strongly amongst the Engineers, who have to regret three Gentlemen well known to myself, and with two of whom I have acted professionally to a considerable extent.

The first is James Walker. He had an immense practice, he lived to a great age, and was certainly one of our most successful private Engineers. He was one of the earliest supporters of the Institution of Civil-Engineers; and I recollect well belonging to that now-flourishing body with him, when, many years ago, it met in an "upper chamber" in the Adelphi, with the humblest of all arrangements and applications: but Telford *was the President*; and under his great name the Society soon became important. After his death Mr. Walker was elected to fill his place, a position he retained with success for many years. The profession of Engineering owes a debt of gratitude of a singular kind to James Walker, for he succeeded in establishing that enormous scale of charges now universally adopted by Engineers, which leaves all the earnings of Architects far behind; and are very different indeed from those recorded and quoted by Mr. Smiles in his charming "Lives of the Engineers."

John Errington, the partner and friend of Joseph Locke, died most unexpectedly in July. He was content to live quietly under the shadow of his great associate, and though a man of ability, I am not aware of any great work which may be attributed to him.

With Mr. Locke and Mr. Errington, in earlier days, I had much to do on the Paris and Rouen, the Rouen and Havre, the Caledonian, Scottish Central, and other lines of Railway, where I was the Architect, as they were the Engineers. They confined themselves strictly to their departments; Mr. Locke having at an early period laid down the rule that as regarded buildings, "an Engineer's functions ceased with the platforms." One of Mr. Errington's latest works, and in which I had the pleasure of co-operating with him, was the Yeovil and Exeter Railway. It was his last work, as it probably will be mine; and I may be permitted to remark, as somewhat curious, that influenced either by the "*Genius Loci*," or by other considerations, Mediæval Architecture was introduced. At Carlisle and at Perth, and more recently on the Exeter Line, I have done my best to mould the forms and modes of thinking of Mediæval Architects to the unusual requirements of Railways. At Rouen, in the two Stations, at Havre, and at Southampton, Gosport, Blackwall, and other places, I adhered to the more usual styles, and perhaps with better success.

The last name which I have to mention is that of James Berkeley, who fell a sacrifice to the effects of the baneful climate of India, at a comparatively early period of his life. He was a pupil of the younger Stephenson, who recommended him to this appointment, and he did ample justice to the recommendation; for his works in India in the ascent of the Ghauts, are spoken of in the highest terms as monuments of engineering skill and perseverance.

Before concluding, I am requested by the Council to draw your attention to certain changes which they have made in our own system, and particularly to the arrangements for a voluntary Examination of our rising Members.

The fact of the system of Examination for Offices in all the Services under Government having worked satisfactorily, seems to have led to a desire to introduce a similar system into the Education of an Architect. With this view, a Committee was appointed, which has drawn up a Series of Examination Papers of great value, and which have been extensively circulated. The Architectural Association has taken up the matter vigorously; and we earnestly hope that our young friends will avail themselves of the advantages which *must follow a Successful Examination.* These Examination Papers limit the books referred to be consulted, to those which are found in our own library; *and in order to render those books more accessible, the Library will be opened Every Day as usual, and also every Evening, excepting Monday, from Seven o'clock until Ten, and the new Librarian, Mr. Dollman, or Mr. Henry Moody, will be always in attendance to assist the Students, and supply them with the works which they require. I have also to add, that the Last Day for the Applications to be made by such Gentlemen as desire to be examined, will be Saturday, the 27th of December.*

Another series of Regulations adopted by the Council, having reference to the Circulation and publication of papers, is as follows: That the papers will be issued by the Council three times in the session, viz., at Christmas, Easter, and at its close, instead of only once, as at present.

We shall employ our own reporter; and, except on special occasions, no other will be admitted.

The Honorary Secretaries will prepare abstracts of papers and proceedings, which will be delivered regularly to those journals interested in their publication, upon the payment of a small fee.

The Honorary Secretaries will also prepare a short summary for other journals.

In order to facilitate these arrangements, papers intended to be read should always be placed in the hands of the honorary secretaries a few days before the one appointed for their reading, with a view to the preparation of these abstracts.

The Council are informed that the Curators of the Architectural Museum have received notice to remove their collection from South Kensington. Nothing would be more acceptable to the Council than to receive that collection within this building, for which there is ample accommodation, provided some portion of the premises now let off could be engaged for that purpose. The Council have pleasure to announce that Mr. Cumberlege has presented the Institute with his 10 shares, and this mode of increasing the funds of the Institute, and meeting the additional expense of accommodating the museum, is suggested by the Council as a convenient mode of effecting those objects.

Mr. ARTHUR ASHPITEL, V. P., moved, and Professor KERR, Fellow, seconded, a vote of thanks to the President for his Address, which was carried by acclamation.

MEMOIR OF MONSIEUR CHARLES FREDERICK NEPVEU, ARCHITECT, OF VERSAILLES.

By Professor Donaldson, Ph: D. Fellow.

When this Institute was first organised, its founders had in view, as one of its objects, the creating and cementing a feeling of mutual regard among us as professional men. Its sphere of action in this respect has been by no means local, nor confined to the architects of this empire; but extends to our foreign professional brethren, whose studies, whose researches, whose works and whose fate we watch with deep interest, so that we sympathise with all their varied fortunes, their successes, or their failures. It is in such spirit that we have noticed the honoured lives of several whose names stand high in the chronicle of European fame. And yielding to the earnest request of our valued and respected Fellow, Mr. Cockerell, I am anxious to communicate to you some notice of one we honoured and esteemed as a friend and a professional brother. Gentlemen, there are two lessons to be learned in the life of every architect, nay of every artist and man of science. There is the artist, the man of genius, of lively imagination, profound knowledge, and sound wisdom.—There is the practical man of incorruptible integrity, independent spirit, frank in his loyalty, endowed with ingenuity and skill. These varied endowments may be combined in some rare instances. In a Wren, a Chambers, a Percier, a Soane, and a Barry. But I have to record some traits in the life of one, who, without rising to the highest round of the ladder of fame, occupied a position, honourable to himself, valuable to those he served, and from whose example we may derive a useful lesson.

It was my sad privilege, on behalf of my English brethren in art, to say a few words at the grave, which received the remains of Fontaine. I have now to present to you a few remarks on the career of his pupil, Monsieur Charles Frederick Nepveu. He was born on the 14th of July, 1777, at Paris. He pursued his youthful studies in that city; went through his course of mathematics, and that not a superficial one (as we know) among the French; and in the Atelier of Percier and Fontaine acquired his knowledge of architecture, and studied painting under Regnault and Bertin. He afterwards visited Italy to perfect himself in his art, bringing back with him folios well stocked with sketches and drawings made on the spot, sparkling records of the lively impressions of everything he had seen. These impressions never quitted him; to the last he would often allude to them in a most graphic manner, and with a discrimination and taste worthy of the school, in which he had been brought up.

His first public appointment took place in 1807, as assistant to Mons. Hurtault, who was Attached Architect to the Chateau de Fontainebleau, under the title of "*Controleur des Bâtimens de la Couronne*," an office corresponding in duties and position with what once existed in our own Royal Palaces, under the less-pretending title of "*Clerk of the Works*," to which the leading men of fame in the profession on either side of the Channel (or some lucky wights in court favour) were usually appointed. To the former an honourable distinction, and affording an elegant retreat, where they might retire a day or two in the week, or some months in the year, to fulfil their local duties, or refresh their minds in retirement; with an emolument, apart from the honour, little tempting to men in great practice, yet sufficient for some, who had not the ambition or energy to make such an appointment subservient to higher purposes. In this country the place and the title have now generally been taken from the professional man and bestowed on the more plodding mechanic, who can repair a decayed wall, or make good a rotten floor or roof, satisfied, as well as his employers, if it be soundly and substantially done, regardless whether the high art of the original may have been ruined by his ignorance, or shorn of its grace and propriety by his blundering or uneducated stupidity. The profession has lost such honourable brevet rank, and our finest palaces, cathedrals, and town halls, their best vindicators and preservers. They have been handed over to the rude mason and carpenter, who have succeeded to the accomplished architect. But I wander from the immediate topic of my paper. I remember a certain round tower in one extremity of the gardens of that fairy palace of Fontainebleau, where my friend Blouet and his devoted wife were its occupants. Every feature was of the graceful Renaissance style, conceived and carried out in all the charm of the sixteenth century, which produced a Blois, Chenonceaux, Azay le Rideau, Chambord, &c., &c. Its high pitched conical slated roof, its graceful lofty chimney shafts and pointed dormers, with its circular staircase of stone leading on each floor to two or three lofty rooms, one at least of princely size. Its very name gives it an historical value. The Pavilion de Sully at Fontainebleau was not then thought too good for the architect of the Chateau, as it has since been. Nepveu, as a practical man, carried out his duties at Fontainebleau most trustworthily. It requires one well inspired with all the graceful feeling of the style not to touch such a wild fanciful building, or, I should say, such a congeries of buildings, without imperious necessity; nor to restore without immense study and research. To destroy would be barbarous. Fontainebleau is rich in its history of stirring events, written with a pen of steel and ink of blood; amidst its revelry and jousts and tournaments, assassination has stained its floors to rid a sovereign, and that sovereign a woman, of the man she hated and feared. But it was also here, at a later period, while Nepveu was at his post, that the first Napoleon abdicated and bade adieu to his vieille Garde and to his hopes of longer guiding and ruling the destinies of France, and left for Elba. The patriot zeal and personal loyal devotion of Nepveu, roused by this great catastrophe and by that profound emotion, which the Emperor knew how to excite in those by whom he was surrounded, were at their highest pitch. In his enthusiasm he entreated to be allowed to follow the fallen fortunes of his great master in any position, however humble. Concession to his earnest prayers was inexpedient, and he was left to guard his post, and this he did bravely till the Bourbons were reinstated, and he was superseded by one more hostile to the banished Emperor. In 1821 he was appointed by Mons. de Lauriston, Ministre de la Maison du Roi to the palace of Rambouillet, as the King's Architect, where his skill and attention preserved many parts from decay, and considerably improved others. He was also extensively employed in private practice by some of the noblest and most influential families in France. He was at Rambouillet in 1830 at the period of the coup d'etat under Charles X, and it was from his palace that that unfortunate king went into exile. Upon this occasion, as at Fontainebleau, Mons. Nepveu proved his loyalty and exerted himself to the utmost to serve his master, and would willingly have followed his fortunes, had not the king commanded him to remain at his post, and save from injury the palace and its dependencies, which had been confided to his care.

In 1832 the domain of Rambouillet was detached from the Crown property. Casimir Perier was the Prime Minister, and Nepveu's old master Fontaine was his professional adviser and architect of the Crown. He recommended that his former pupil should be transferred to Versailles, a nomination approved by Louis Philippe, by whom he was named Architect also to Compiègne. A generous trait on this occasion marks the liberal character of M. Nepveu. In connexion with the appointment of Architect to the palace of Versailles, he was also to have the post and emoluments of Superintendent of the Water Works of Versailles at Marly. But with a graceful disinterestedness he got his old friend Mons. Ceeil appointed as the Engineer instead of himself, as Mons. Ceeil had erected the new hydraulic steam engine, that had superseded the old cumbrous machine of Louis XIV, and which had originally raised the waters of the Seine to the upper level of the aqueduct and reservoirs for the service of the palace and gardens. Towards the end of 1832 M. Nepveu actively carried on various works, and improvised in forty-eight hours a charming theatre in the Tennis Court at Compiègne, on the occasion of the marriage of the daughter of Louis Philippe to the King of the Belgians, and he was publicly complimented on the success of this temporary erection. I cannot here forbear to observe, that formerly in England the Architect of the Court was called upon to prepare not merely the temporary erections, but the machinery and scenes, and even the designs for the costumes of the masques and dramatic pieces that took place on State occasions. In these Inigo Jones displayed great imagination and playful fancy.

It was not left to the upholsterer or mere decorator, a class of men most useful and necessary in various ways, but who ought never to be introduced, except to assist and not to supersede the architect. In Italy and Germany we find also the artist, and not the mechanic, consulted upon like festive occasions, to make the requisite arrangements and prepare the appropriate embellishments. The annual fêtes at Paris afford frequent opportunities, and we know how the brilliant genius of our French brethren in art rise to such occasions, and transform the squares—the gardens—nay, the Champs Elysées themselves, already sparkling with beauty and fountains, and kiosques, and theatres, and elegant places of pleasure, into fairy scenes with triumphal arches, colonnades, trophies, pedestals, statues, arcades, and every variety of embellishment, with a success and fitful "*capriccio*," yet at the same time purely artistic, that make one wish they were the solid, substantial works, meant to endure, instead of the temporary decorations for the passing festival. With us it requires a quarter of a century to give rise to an appropriate and fitting opportunity. A European peace after a thirty years' war, or the crowning of a beloved sovereign—and even then, who are the men employed to represent the arts, and produce designs and works that shall live in the memory of the generation?

There are few at this time (and among those few I hope I may be pardoned if I include myself) who can remember the distribution of the Palace of Versailles, the proud creation of the proudest of French monarchs, Louis the XIV, and upon which, and its gardens, and its park, and its Trianons he had expended nine millions of our money: an extravagance that amazed the king himself, and which made him desire to have the accounts destroyed, that no such memorials might continue to exist of his lavish expenditure. This palace of European reputation had its noble marble staircases, and its majestic suite of rooms facing the park, of noble size and proportions and decorated by the pencil of Le Brun; its theatre and its chapel, which excel in beauty and execution every like works in the world. Besides these, there were grand suites of apartments for the king and queen, though there were certain rooms even among these (as I well recollect) occupied by Marie Antoinette, small, ill-lighted, and with intricate communication the one with the other. Independently of these the rest were a confused jumble, an inextricable labyrinth of rooms, most of them small and comfortless; and in these it was held to be a high distinction for princes, nobles, grand seigneurs, officers of state, officers of the court, to be lodged. The nobility of the land were content to put up with all these inconveniences—they preferred to live under the same roof with their king as his courtiers, under circumstances however in this respect degrading, rather than to be free in their own chateaus, in the midst of their own lands, surrounded by their own tenantry. Each coveted his small apartment at the palace; it was a mark of credit, of proud distinction,—it was a step to fortune.

Under Louis Philippe the Chateau de Versailles had been deserted, except on such occasions as when the fountains played, and attracted the tens of thousands of Parisians to its pompous gardens. The expense was a heavy drag upon the civil list. Louis Philippe, a man of quick intelligence, (and particularly so under such circumstances), determined upon converting the Palace into a National Museum, and transferring it to the nation's care. He himself laid down the programme, and prescribed the details. The main state apartments were to be swept away, and corridors and galleries were to be substituted to receive pictures, sculpture, and every possible illustration of the history of France particularly its wars—its battles—its triumphs. Monsieur Nepveu (eminently a practical man) carried out the ideas of the king with great success. He transformed the cellular labyrinth of small apartments into handsome and spacious galleries, and the low floors and entresols or mezzanines into lofty storeys such as we now see them. He had to combine these with the rooms and halls that remained, and to arrange his construction, so that the exterior elevations of the Palace of Louis XIII should remain the same, as though untouched within. The Galerie des Batailles, filled with the chefs-d'œuvres of my friend Horace Vernet, and other eminent painters, is one of a vast suite and extremely well lighted, direct from above—a system for picture galleries, which hitherto had existed only in a few localities, as in Florence, and our British Gallery, Pall Mall. It has now for some years been accepted, as the only proper system, and introduced into the gallery of the Louvre, where the productions of the great masters are now seen in all their full beauty, instead of their effect being destroyed by the cross-lights from the windows on either side, as of old. These works begun in 1833, occupied till 1837, when the inauguration of the new arrangement formally occurred; the old Salle de l'Opera, which had been abandoned, having been restored, and the theatre renovated. In these a grand fête took place, and the king, surrounded by his family, his ministers and his court, and the great celebrities of art, science and literature, presided on the occasion, and declared the Museum of Versailles a National Establishment. During the course of the operations, M. Nepveu had a difficult task, and to reconcile the most opposite circumstances. There were the ideas of the king, grand and princely, but not always very practicable. There were the existing constructions, which seemed to baffle the experience and ingenuity of the architect, to make them conform to the data laid down. Attached as Monsieur Nepveu was by his national instinct to his sovereign, and respecting his views and ideas, he felt himself obliged occasionally to oppose them, as incompatible with what he felt to be architectural proprieties. The king was firm; so was the architect. The king was naturally cool and deliberate, the result of his exalted position. The architect was as naturally impetuous, sensitive, and, when roused, would display too much *warmth*, perhaps a little too much *obstinacy*, not from any want of devotion or respect to his royal master, but from confidence in his own convictions.

Louis Philippe considered himself a perfect judge of building matters, as good a one, if not a better one than his architect. Many were of the king's opinion. Whether they were competent or disinterested judges, I know not, but Monsieur Nepveu had different views. On one occasion, irritated beyond all sufferance, which was very rarely the case, by the too great persistance of his architect, the king said, "*But, Monsieur Nepveu, I wish you to know that I have had a great deal of building done for me,*" and "I, Sire, I have my ownself built a great deal," was the retort. With these words the king broke off the parley, and walked off without saying another word, as though he had finished for the day his inspection of the works in progress, and, as usual, was followed by Monsieur Nepveu, who felt deeply the mortification of having too long maintained his own opinion. The king, whose naturally kind disposition would not allow him to leave a trace of his displeasure upon those so devoted to his service as Monsieur Nepveu, and whom he sincerely respected for his honest frankness, and noble simplicity, and integrity of character, paused in one of the vestibules, seeking to say something to his architect, which should not revive the irritating subject, as he was sure that Monsieur Nepveu was a man ready to renew the contest, if provoked. The ceiling of the vestibule was painted, and the king had seen it a hundred times, but he asked of Monsieur Nepveu some explanation of the subject. "*But what is that figure in the angle,*" said the king. "*Sire, that is an allegorical figure. It represents firmness in a king, and obstinacy in a poor architect.*"

In 1848, the Revolution hurled Louis Philippe from his throne. This contradictor of his King was among the few, who rallied round him as he passed through Versailles in his flight, furnished him and his family with money, clothes, everything he had disposable at the moment to assist them. He came over yearly at his fête to present his respects to his fallen Sovereign. He attended his funeral, and year after year, on the anniversary of his death, paid his visit to Weybridge, as a pious pilgrimage, to join the family in the religious ceremonies of the mournful day. He was never a courtier, till he could become one to his exiled king.

Such events as these three occasions, on which he witnessed the fall of three sovereigns and was found the faithful adherent of fallen greatness, are remarkable epochs in the life of any man. They present moments of agony and devotion; they try the moral constitution of any being; they are the touchstone of the living principle within. It is a happy circumstance in the memory of our deceased friend, that on such occasions of the movement of revolutions, sudden, striking and irremediable, and the catastrophe of dynasties, that could not be averted, he never swerved from the path of duty, of honor, and moral dignity. Independent in his conduct to the Sovereign in power, he was devoted to his interests and happiness in his distress. His ability and ingenuity as a practical architect were ennobled by his character as a man. He was above a subterfuge, expressed his thoughts without reserve; sometimes (as we have seen) perhaps without sufficient caution. He was a judicious critic in art, had much natural wit, and threw his whole soul into the works upon which he was engaged. Somewhat excitable and hasty in temper, he had nevertheless so much amiability of disposition that he attached to himself all, with whom he came in contact.

On one occasion, when I visited my friend during his residence in one of the noble dependencies of the Palace of Versailles, and while he was engaged in his large operations, I recollect his shewing me the original construction of the flight of steps, which leads from the terrace parallel with the back of his house. I never saw any piece of construction more masterly, more sound, and more carefully done, than the mode in which the steps were set and so combined together as almost to defy destruction. And indeed he assured me that the rest of the castle, with which he had had to do, was throughout as solidly and soundly carried out. In fact this may be seen by any architect, who may carefully inspect the "coupe des pierres" of the old staircases, and of the broad landings, composed of comparatively small blocks of stone, but so ingeniously arched together, as to be as solid as our single slabs of Portland or sand stone, eight or more inches thick, which we employ for the like purposes.

When seventy-two years old, Mons. Nepveu retired from professional life, and constantly resided at Versailles, the scene of his proudest works. He died on the 28th of September last, little more than a month since, in the 86th year of his age. After his retirement he occupied himself, for many years and at considerable expense, in completing and putting into order ten volumes of drawings* and 50 volumes of accounts connected with his operations at the Palace. And these he left to be presented and preserved among the records of the building in the Pavilion de Monsieur, where a great number of his drawings were already deposited. He was a member of the Legion of Honor.

Such are the few memoranda that I have been able to collect from a notice furnished me by Mme. Nepveu, his widow; from the articles in the Debats, 19 Oct., by Mons. S. Marc Girardin, and in the Union de Seine et Oise, 4 Oct., by M. Onesyme Leroy, with some recollections of my own of this worthy, excellent, and warm-hearted man.

Thanks were unanimously voted to Mr. Donaldson for his Paper, and the Meeting adjourned.

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* AT the subsequent meeting PROFESSOR DONALDSON presented from Madame Nepveu a portrait of her late husband M. Nepveu, and stated that since the last meeting he had visited Madame Nepveu at Versailles, and had seen the books of M. Nepveu relating to the alterations at the palace. He said, it appeared from that record, that King Louis Philippe went every fortnight to Versailles to see the progress made in the alterations at the various parts of the palace. He was accompanied by M. Fontaine, the chief architect to the Crown. M. Nepveu minutely recorded every fact connected with these visits, such as the time of the arrival of the king; the particular points he went to; the observation his Majesty made in every room and every hall. He noted all the alterations the king had suggested, the several estimates of cost, and who where the persons entrusted with carrying them out, &c., &c. Those reports, as also the countless plans, sections, elevations, and details filled a vast number of volumes, and formed a very curious series of historical data as to the progress of the operations. By a letter dated from the Palace of the Tuileries, 15th Dec. 1862, Marshal Vaillant in acknowledging the receipt of these volumes announces, that, in accordance with the wish expressed by Madame Nepveu, the two lines of trees existing on each side of the Place d'Armes, at Versailles, in prolongation of the Avenues of Sceaux and S. Cloud would receive the designation of *Avenues-Nepveu*, as a mark of respect to the memory of her husband, justified by his services and by the honourable *souvenirs* which he had left in the town of Versailles.

ROOF OF CATHEDRAL AT MESSINA

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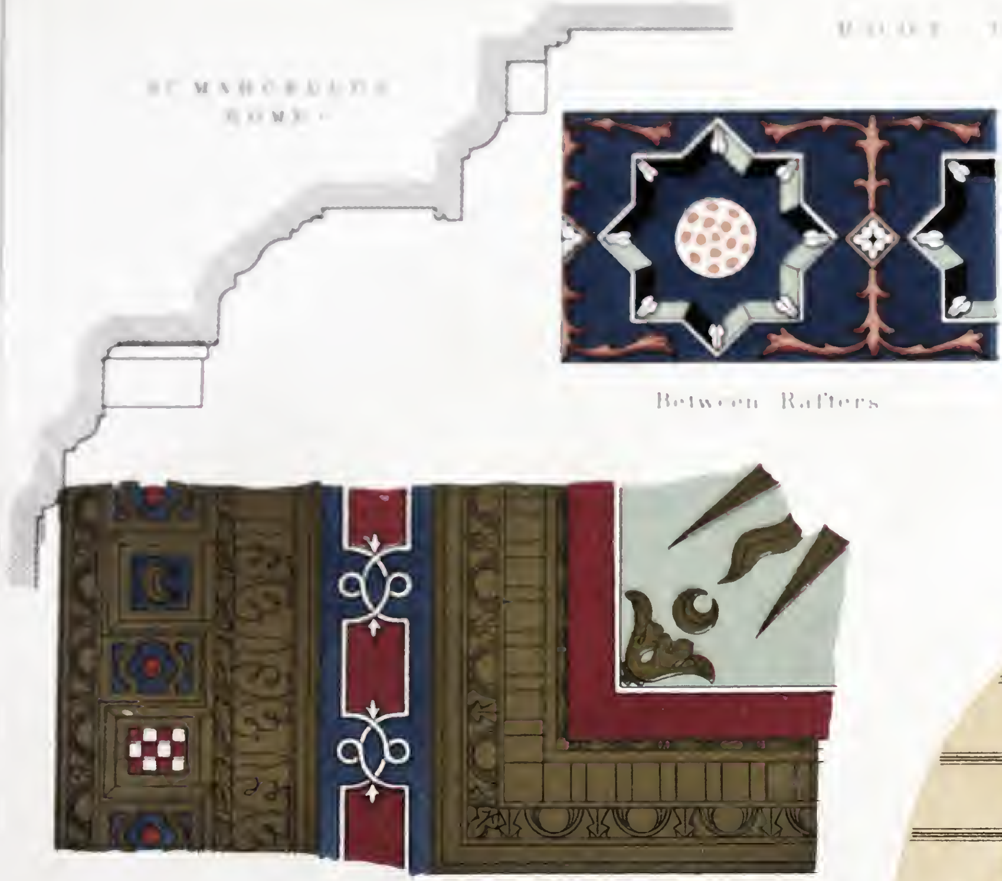
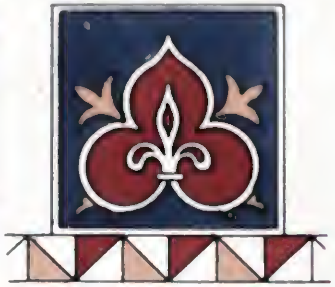
ROME.



Between Rafters



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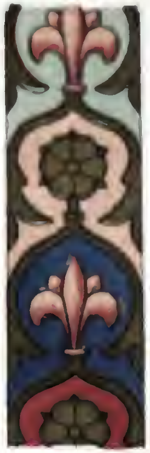

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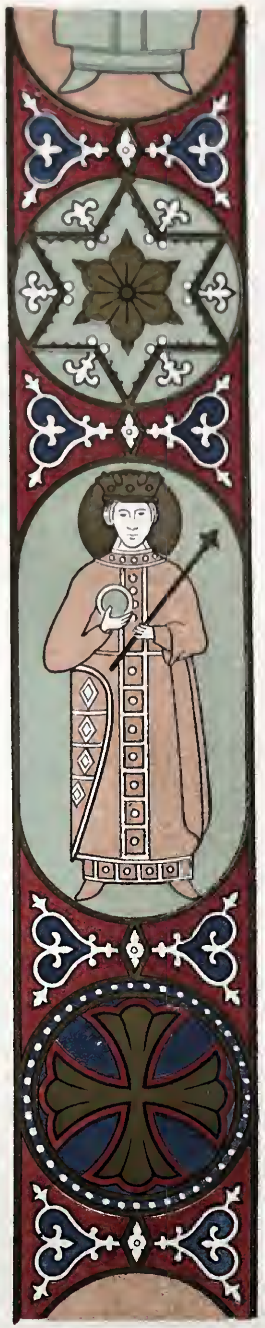

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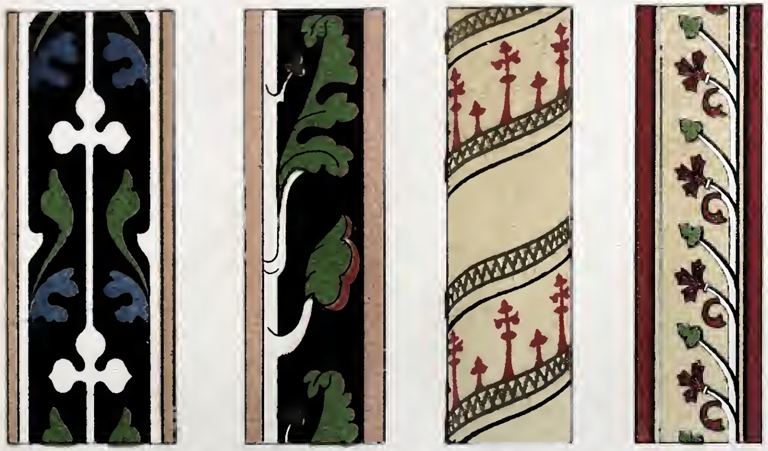
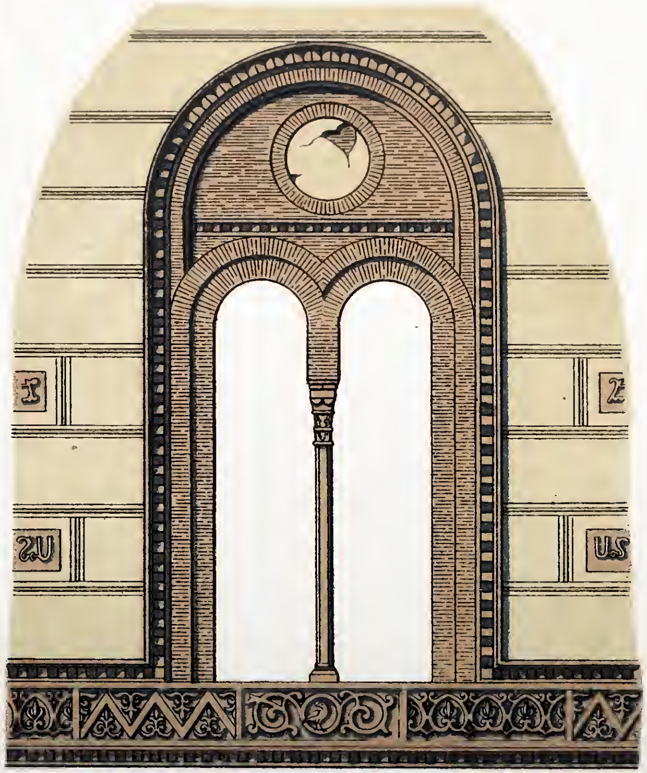
Soffit of Principals.



MODERN DECORATIONS FROM THE CHURCHES OF PARIS.



SMALL GREEK CHURCH AT ATHENS.

J.R.Jobbins

SOME REMARKS ON COLOR AND COLORED DECORATIONS.

By T. Hayter Lewis, F S. A., Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, Nov. 17, 1862.

In bringing before you some memoranda on the above subjects, I shall have doubtless to go over some well-worn ground. But I must ask your indulgence, partly because I am myself altogether a heretic as to much that is now taught with authority upon them, and so wish to give clear grounds for my heresy; and partly because it leads us to consider some experiments, which, pleasing perhaps in themselves, may induce more careful study of the matter than is usually bestowed upon it, and open out new paths of research to those who have more time to tread them than I have.

No one can deny that the study is necessary. The wonderful eruptions of red, white, and yellow stripes, which form the leading features in many of our suburban brick erections, show that a taste for color (good or bad) is popular; whilst the admiration excited by the coloring of the International Exhibition in some persons, and its strong condemnation by others whose opinions are equally entitled to respect, must show us that the grounds of such taste are at the least unsettled.

It is, I think, true, that the *theories* of color are quite of our own time. The grand old architects, and painters, who stamped indelibly on their works and ages the marks of their great minds, wrought each, so far as is known, solely relying on the power of his own genius, steadied by the traditions of the times before him. The old mosaicists of Palermo, Ravenna, and Rome; the painters of Assisi, Venice, and Mantua; the architects who lavished such vivid coloring on the Roman SS. Marcello and Susannah, the artists of the glorious glass of our own Canterbury, worked for the wonder of succeeding ages, unknowing of the rules now binding us, and ignorant of the prism's very being. They used the vividest of colors in the most prodigal of ways, and, almost always, well; and we must look upon them as men to whom art and its offshoots had so been their very life, as to lead them to do by intuition, what we attempt with fear, and by painful and laborious steps.

Let us now try a little what we know, or think, or are told we know upon the matter. The best known writer, perhaps, is Chevreul, whose very carefully written and elaborate (perhaps *too* elaborate) work investigates the different contrasts and harmonies of color. His chief facts thereon are to be found adapted in a condensed form, in Mr. Redgrave's manual. These books go deeply into the several questions of shades, harmonies, hues and contrasts, all based, no doubt, on strictly defined and scientific principles, elaborately fortified by the testimony of the prism, and, altogether, are laborious and clever works; of much use also to painters, decorators, carpet makers, and elementary students of all classes, for whom they were no doubt intended. Nor can I believe that their authors ever meant or wished them to take higher rank than this, or to act as more than the merest grammar for the colorist. For I suppose that of all assumed to be really written upon art, these works are about the least artistic; nor can I, in their elaborate pages, trace one particle of the lofty feeling which should guide the pencil of the artist. But be these theories right or wrong, they were not, we *know*, the basis on which the olden masters worked; and as well might we attempt to read an Assyrian inscription by an English Grammar, as to decipher their art principles by the aid of these new theories, based upon Newton's prism. Even were the prism theory right, Newton was only at the beginning of the work, and much that he deduced has since been modified. Compare, for instance, his prismatic colors with Woollaston's. They are different enough. Which will you take? Or, if neither will do, try Frauenhofer's, or, differing most vitally from all, take the coloring of the School of Design. There is range enough between them for a dozen theories.

We may take the chief of the rules now put forth to be shortly as follows, viz.: That white light is composed of three colors (primaries); that perfect harmony in the arrangement of colors requires that these three be present, either pure or in combination, and in the proportions in which it is alleged (though this is very doubtful) that they occur in white light, viz., three yellow, five red, and eight blue. That blue is the coldest and most retiring of all colors, and orange (a secondary) the warmest and most advancing. These results are derived, to a great extent, from experiments made by Mr. Field, and elaborated by M. Chevreul; and as they come forth with great authority, as the bases of our government teaching, we ought to be doubly careful in seeing that there is no error in it at its outset.

Try, then, these theories in the rudest and boldest way, and see the coloring with which nature tints her loveliest scenes. The bright grass foreground forming a verdant carpet to the woods around, has for a contrast the deep blue sky. Will you follow out the theory and change that lovely foreground to a red? If not, where are the rules? But nature is a great overthrower of such things. Work out your theories by the prism or the brush, and go then to the next field, or garden, or flower, as I have many a time, to see them all demolished. Try nature's phases from month to month. Who has not felt the gay and *riant* feeling that the bright and joyous tints of spring produce; the lovely contrast of the delicately light larch against the deep dark fir, and all the bursting shoots bright with the youth of their life? But a few months past and these tints will have tamed down to the rich maturity of summer; and again a little while and the deep, dark, grand coloring of autumn will have charmed us with its decaying splendor. All beautiful, yet there's not a tint that has not changed; not a contrast in the one that does not meet a counter-contrast in another. How can a theory which serves out color in definitely fixed proportions agree with the changing beauties of such scenes? Or, try the flowers. See how the chaste white blossom of the pear, the delicate pinkish apple, the brilliant yellow of the gorse and broom, contrast with their huge attendant masses of green. The prism theory won't do there. You can't get three of yellow and five of red and eight of blue out of *all* of these, if you can even out of any. I have analyzed these tints in every way that I could think of. But my theories formed on one flower all came to grief at the next: so I went back to our friends the books, and thought that, as Field's experiments have been made the basis of all authoritative teaching since, I would follow in his footsteps, and learn as he had learnt. I found, then that this experimentalist (undoubtedly a painstaking and very clever man) had taken for his colors certain liquids, or, in their absence, colored glass. Here they are[*]—for blue, sulphate of copper; for yellow, aqueous tincture of saffron; and for red, liquid rubiate, or madder lake. The latter is tolerably good; but it is clear that the yellow is strongly tinged with red, and the blue with yellow. The glass is worse: and I do not believe that an approach even to a pure blue or yellow glass exists. Guess at the exact results which such materials must give. We must then try first to get at pure color. But what are the pure colors? I asked some decorators for their best, and there they are on paper,[*] as different as they well can be. Which will you choose? They can't be all right. We must have a better standard than the eye if these be the results, and for that standard we may seek the prism. Not that I would dream of realizing such purity as that; but if a standard must be had, we had better seek the highest. Here is one of Frauenhofer's prisms, though a common glass drop will give such tints as shame our brightest; and I wish to show a way of getting, or as near as may be to, its colors.

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[*] The liquids and diagrams referred to were exhibited at the meeting.

Take, then, a brilliant white—say, for example, a white rose or a camellia, surround it with its deep red comrades, and look at the bouquet through a glass or other transparent medium of precisely the hue of the red, and the latter will not receive a darker tinge from the colored medium, but both red and white flowers will seem to be of precisely the same tint; and by a singular optical phenomenon, for which I am quite unable to account, that tint is not that of the flower, but almost white. Were it not that others have found the same results, I should have thought it the result of my defective vision. I may mention, by the way, that a pure white ground is not quite so easily obtained as may be thought. Now if your red glass, for instance, were of the same tint as the pure red of the prism, the latter would show neither its yellow or blue through it; and if this glass were of the same color as the red flower, the white one would be colored by it like the red; and thus the tint of the red flower (assuming that one brilliant enough could be found) would give a complete standard of a pure red color. So I tried all sorts of glass and all sorts of colors. Blue and yellow are quite out of the question. Seen through a thin sheet only, they may seem tolerably good; but intensify the colors by putting several sheets together, and the blue becomes purple, the yellow becomes red. The red glass is better. Then I tried liquids of all sorts in flat glass vessels, and got somewhat nearer the mark, so near, indeed, that I had almost hoped to succeed. The best, perhaps, being for blue, nitrate of copper dissolved in caustic ammonia; for yellow, pure chromate of potash, or prussiate of potash (ferro-cyanide of potassium); and for red, perchloride of iron reddened by sulpho-cyanide of potassium. But the powerful red rays of the prism came through the blue, and the red rays through the yellow.

Before leaving this part of the subject, I may mention that it is of some consequence with respect to stained glass. If there be much white glass in a window, the background may have a most powerful effect in neutralizing the color in it; and the more powerful will be this effect, as the glass is the more transparent. A window whose red colors would come out well and clearly against a light sky or a stone building, would have them almost deadened by a back-ground of trees, be their green ever so lovely. With such glasses as Powell's, for instance, the effect is of course better.

To return from this digression. I tried experiments of all sorts; and, although assuredly satisfied that those of Field, painstaking though he was, could form no safe basis of a theory so delicate as that on colors, I could offer no better of my own. One thing, however, did draw my attention strongly. I found that I could, with some degree of success, match with my glass or liquid some of the bright red tints of the verbena and geranium, or the blue of the lobellia. Yet no green that I could find or invent would even approximate to *any* tint of *any* leaf, light or dark. Received through any medium, however dark, it stands out strongly and boldly against the bright white ground, almost as though the medium were colorless; and it occurred to me, after repeated trials, that this must be owing to the green being mixed with more red than one usually imagines, and thus stopping the rays. That this can be altogether done, you can see in a moment, by looking at fine red and green glass separately, and then together. Separately, each is perfectly transparent; together, they shut out almost every ray of light. So I took several sorts of flowers and leaves, and tried the quantity of the different primary colors necessary to match them as nearly as they could be matched, and, though agreeing with my own notions, I certainly was surprised at the result. The drawings show the very large proportion of red or brown required, even with our impure colors, to match even the most brightly tinted leaf; and though we all know that the great bulk of nature's coloring is a strong neutral tint, and that the eye, though enchanted, becomes fatigued when even flowers are massed together in too large quantities, I for one was quite unprepared for so strong a neutrality. We may then assume, as a rule, that the use of strong, pure, positive colors in large masses is not authorized by the teaching of nature. Strong neutral tints should be the general tone of the ground, whilst the vivid and sparkling effect is added by the few bright but scattered colors of the flowers, or by their still more vivid white. But I can find no rule for this neutral tint—no definite mixture of three, five, and eight. It varies as the seasons vary—lightens into yellow with the bright spring, and tones deeply down to red in the rich autumn; and, setting aside the flowers, all that is lovely in landscape is produced by contrast of tone, not color. By the bright green of the young shoots against the dark sombre green of the older wood; by the gay light larch against the dark green fir. And all these, mark you, against the deep blue sky as a background. I never *can* study nature long, and then go back to study these manuals of South Kensington. Yet I do not deny their use. They may be good as ground-works, as leading strings in the infancy of art; but go one step beyond, and their rules are fetters to it. I will not detain you with any further details of them, but merely say, that, aided by others better versed in them than myself—practised chemists and able experimentalists—I have tried again and again their various experiments, and that, neither in practice nor in theory, could I get the same results that these manuals give. All that I feel certain of is, that the colors do not, as a rule, exist in nature in the proportions of three, five, and eight, either by theory, or by experiment.

Some other works, however, on the subject are well worth our study. The author who has, perhaps, most studied the coloring of nature is Sir G. Wilkinson, who enters most fully into all the details of it, with the eye of a painter and the learning of an antiquary, and has embodied the result of his studies in a very excellent treatise.

Dispersed amongst the Transactions of this Institute (the value of whose records is scarcely, I think, quite recognized) are several most interesting papers. I need scarcely allude to Mr. Owen Jones'. The mention of his name will suffice to bring to your mind his works connected with my theme, and I will merely call to your mind his lectures, delivered here in December 1850, and December 1856, and if I read his works aright, he has been made answerable by the public, most unjustly, for much of the academic teaching now in vogue, and for which I find but little warrant in his own works. In these, and in the lectures, also given here by him, and by Mr. Donaldson in 1852, by Mr. M. Digby Wyatt in 1860, and by Mr. Aitcheson in 1857, together with the discussions upon them, in which are found to be the opinions of Messrs. Burges, C. R. Cockerell (R.A.), T. L. Donaldson, Fergusson, Penrose, and others, are to be found nearly all that has been said or known upon the subject. To nearly all of the above gentlemen, and to Mr. G. E. Street, I owe very sincere thanks for their loan to me of very numerous and valuable drawings for exhibition here this evening.

I now leave the theory of color, and will venture to offer a few remarks upon the practical use of it in decoration.

And first, as to the materials upon which it is to be applied—no unimportant groundwork. It is the opinion of many who have as much right to be heard on the subject as I have, that there is a certain relationship to be observed between the coloring and the material on which it is to be applied; that, for instance, a wooden structure, or a structure supposed to be of wood, should have a different treatment from one of stone or plaster, and that such difference was observed by the old colorists. I have not the slightest belief either in the theory or its supposed practice. I believe that the architects of old built up their structures of iron, or of wood, or of stone, with such bearings and thicknesses and supports as to shew clearly and well that it was of such a material and no other; but that having done thus much, they put upon this skeleton such color and such gilding as might best suit them, to give the general effect required; that they put on such color, heedless of what it covered, and that if the stone or the wood formed a bad ground for it, they hesitated not to cover that stone or wood with plaster, to make it a better. We know that such was done from the earliest times, and you have only to turn to two most useful books, that stand side by side on our library shelves, to give examples enough. The work by my old friend and fellow pupil Mr. Raphael Brandon, on Wooden Roofs, and that on Pulpits by our librarian, Mr. Dollman. We all know that the Greeks plastered over their marble. I well remember seeing at Girgenti *two* coats of plaster over the beautifully rich tinted stone, the under one vermillion, and the upper white, as though the color or proportions had been displeasing, and the work recolored or enlarged: but nothing to remind us of the stone beneath. The same with our own mediæval colored work. Again, at the Cathedral of Messina, perhaps the most magnificently colored open timber roof existing, the whole of the timbers have been covered, as a vehicle for the painting, by a thin coating, not of size, but of delicate plaster. And so, to start with, I say that, having well designed the structure in accord with the stone or the wood with which it is to be built, we may altogether disregard that wood or stone when we come to color it, unless it have in itself the color that we want.

The subject, then, resolves itself naturally into internal and external decoration. In the first almost every thing that we find is artificial, both in outline and construction, and the work admits of the highest efforts of conventional design. The first thing I hold is to consider whether the building is to be self contained or not; whether the light is to be toned, and broken up, and softened by stained or roughened glass, or whether the broad light of day is to come full on us, and bring the outer world into our churches or our halls. Into our rooms, of course, it *must* come; but it is there so broken up and toned by our curtains and draperies, that the effect is quite subdued; but in our public buildings we must, I think, insist, so far as may be that they be self contained.

1. The most important thing I hold then to be, to resist the obvious temptation of seizing on the great bare surfaces as mere grounds for color, and taking the key note, as it were, of the coloring from them, instead of examining the whole design, irrespective of the color, and letting the latter follow and help out, if need be, the former. In fact, to let the decoration wait on, not, perhaps, spoil the architecture. This is a simple rule—to me an obvious one—yet disregarded to an extent quite serious. I could point to one great building, whose main feature was a long succeeding range of columns, each carrying a ceiling rib, and where the want of height was strikingly apparent; the decorator colored the ribs of one strong color, and the columns of another, and diminished the height to an extent beyond belief. I could point to another case, wherein the light came all, or nearly all, through the windows of a clearstory, the columns under being seen dimly against the shade of a dark gallery; but the decorator could not resist the surfaces of the roofing ribs, shewing so nicely in the strong broad light, so he painted them in the most vivid colors, put in the columns with sombre tints, quite different from the roof in hue, and thus cut the building as completely in half as though the roof of one structure had been put on the columns of another.

2. The next thing, I apprehend, is carefully to consider how much of the actual materials used in the construction can be used as a groundwork for the decoration, and form, as it were, the key note of the coloring. Generally it will do so; for there are few materials that will not, in the hands of a skilful architect, come well into play. We have in London not a few good examples of the use to which even the common brick can be applied; and who would like to cover, no matter how well, the beautiful grey stone of Westminster? They might do so, I am bound in fairness to own, in Paris; for there the general feeling seems to be to cover every particle of wall, and column, and ceiling with decorative color; and as our neighbours have obtained a license for such works beyond what we can expect to get, even if we could wish it, it may be well for us to see how their experiments have succeeded. In many cases, such as the Sainte Chapelle, S. Germain de Prés, and S. Denis, the whole mass of stonework, walls and roofs is hidden by a screen of color, certainly of a high class, and no mere house painter's work; for almost every column, rib or hollow, has some pretty diaper upon it—itself a study. Yet I cannot say that this mass of color is quite pleasing, and I always turned from its

gorgeous tints to the quieter decoration of many of the other churches, where Nature's coloring had done more, and the painter's brush not quite so much; albeit that their architecture had not fallen to the good old times of the Ste. Chapelle or S. Germain. That wonderfully picturesque and horribly debased old S. Sulpice, for instance, whose slender columns stand out, simply unadorned, against the gorgeous back ground of the colored chapels; or S. Vincent de Paul, and Notre Dame de Lorette, the polished stone (for it is scarcely marble) of whose columns forms a ground work for the color, and a relief to it, which in the former church almost compensates for its wretched glass. The Paris architects have themselves in these examples given us two series from which to choose, and I little doubt that you will follow the more sober one. It is, indeed, elsewhere well followed, in, perhaps, the grandest example of modern times, the Cathedral of Spires recently decorated at a vast expense. Almost the whole interior of this is colored in the most gorgeous manner, and the aid of the first artists called in to fill with frescoes the large blank spaces which we are used to see so beautifully filled by the triforium. But, in all this coloring, the master has been careful to leave of the natural tint the bold stone columns, running from the base to the very ribs of the roof; and the value of these, as accessories to the coloring, can scarcely be over estimated. Yet even this rule, safe as it certainly is, may be badly used. I have seen one Abbey, of no mean fame (and I care not if I mention it—Bolton Abbey) where the fine grey old oak roof, with its clear remains of color, has been *restored!* (what a nice word that is!) by filling up the pores of the old wood, staining it till the old coloring has nearly gone, and the wood is as black as a painted door, grained old oak to order, and then varnishing it all over. I don't put *that* forward as a case of using the materials as a ground work.

3. I take it there can be no question that the stained or other glass in the windows is the next and most important question to consider; for put what coloring you will, none can be so prominently bright as the tinting of the very light itself. Don't fear it. Only put your colors in accord with it, and nothing can be so great a help. In fact, without it I hold that no grand coloring can be perfect; and those, I am sure, will bear me out who call to mind how painfully its want is felt in the gorgeous coloring of Monreale or S. Marc. Again, the drapery of our room fulfils to a great extent the purpose of the glass. I fear that some recent discussions have caused a notion that much stained glass is incompatible with the use of pictures, and that the light is, in fact, tinted by it, and that thus all pictures, all coloring, are seen through a tinted medium. The notion is, to a very great extent, erroneous. Where a ray of light actually strikes upon the wall or floor, it will, no doubt, bring with it the tint with which the glass had colored it; but it leaves it there, and there only. The ray in its long stream across the Abbey or the hall has in it scarce one trace of color, and every tint seen through it is seen almost as purely as though the glass were white.

4. Finally, we must see if there exist any Art works, which, with the stone, or the marble, and the windows, may give us the leading tones of color. Very valuable to the decorator are these Art works if well used, and many a building has been made to look as if it were an auction room instead of a hall, by setting them aside, or putting them too forward. There is no bad example, on a small scale, close at hand, in S. Stephen's, Walbrook; two pictures are there, one on each side the altar, forming part of its architecture, and helping well its dark wood ornaments. But at the side of the church is another picture of immense size, about fitting the space against which it is hung, but falling forward at the top some two feet to catch the light, and clearly forming no part of the design. The architecture and picture are alike spoilt, whilst each might have been of most valuable help to the other.

All that I have been thus long in describing, a thorough artist-architect, as he surveyed the building to be decorated, would have seized upon, I do not doubt at the outset of his study. Let me now ask your patience to consider some of the best known executed works. For obvious reasons I omit any, so far as possible, of modern date in England; and must ask you to call to mind the old buildings of Palermo, Florence, Rome, Assisi, and Munich. In these cities are some of the finest instances of coloring extant; everything is there carried to the very excess in color; and by trying how they are worked, we may learn a lesson of use to us in our more humble wants.

Go with me, step by step, and begin with the walls, seeing first how they, and then how the other parts, one by one, are treated. They are, in many of the best examples, as at Monreale, the Capella Reale, Palazzo Reale, and La Zisa at Palermo, and in the Baptistery at Florence, formed of plain marble, of various neutral tints, the columns being of the same, and no positive colors whatever to the lower parts, except in a few cases where they are marked out in panels by thin borders of glass mosaics (the most beautiful material for decoration invented.) In some instances we have the sides composed of marble and paintings panelled in gold, and in others frescoes form the chief, if not only decoration.

In the Renaissance churches of Palermo is the grandest lining to the walls that I have ever seen, short of the gold mosaics, viz. colored marble mosaic, with the inlaid work boldly raised in reliefs. I have seen no description of this published, but the effect is rich beyond measure. But the most gorgeous ceiling seems too meagre to surmount them. Be the lining of the walls, however, what it may, one rule seems to me invariable, viz. to increase the richness of the work as it increases in height. In the churches, for instance, where the aisle walls and the columns are of marble, the walls above the columns, towards the nave, are richly frescoed, or covered with mosaics. In each case, too, the richness is, if possible, increased in the ceilings, upon which the grandest coloring was lavished, with no fear of seeing it overpower the rest. Where the roof was groined, the mosaics or frescoes, or other coloring of the walls was continued into it with increase of color. Where the roof shewed its open timbers as at Messina, or Pietraperzia, or was honey-combed as at Monreale, they were colored in the most gorgeous way. Where the sides were frescoed the ceilings were so too; part was often put in strongly with a deep blue, and the ribs strongly diapered. Some of the finest examples extant are those in S. Francesco, at Assisi, where Cimabue and Giotto appear as decorators; and I may, perhaps, be allowed to call attention to the efforts now being made by the Arundel Society to have these frescoes copied, and thus preserved so far from the speedy fate which awaits them. Carelessness and neglect are fast obliterating them, and soon they will live, if at all, only in these copies. Where the walls were covered with oil paintings, as at the halls of the Ducal Palace at Venice, at Vicenza, and Versailles, the ceilings, too, were painted and most lavishly gilt, until the gorgeousness of decoration (the use of mosaics having lapsed) reached its climax in the massively grand roofs of S. Marcello and S. Susannah at Rome, a style of decoration which may be seen copied, though in a very humble way, by our neighbours of Paris, in their Church of Notre Dame de Lorette.

In modern times the same principle has been carried out in the best coloring of the Paris Churches, in the Cathedral of Spires, in the fine White Hall in the Palace, Berlin, in many other examples in that town, in Munich, &c. In each case the flooring is in subdued tints; even the Alexandrine mosaics having little, if any, positive color, whilst there is a great deal of greyish white in them. I remember no instance to the contrary, except in the narrow mosaic borders to the rivulet that sparkles so prettily in the centre of the floor of La Zisa, near Palermo; a drawing of which, by my old travelling companion, the late Mr. A. J. Green, has been given by the Architectural Publication Society. Next to the gradual advance of the coloring from the ground to the roof we must consider the actual colors. They seem to have been chosen quite indifferently, the only care being that they should harmonize. The blue ground with the gold stars, now so very commonly used, was then much less so, and seldom quite alone; oftener it formed a relief to the other decorations, parts of the vaulting being frescoed, or distempered, and part put in with this blue; white was, however, sometimes used as a relief, and where a ground was wanted of strong color, it was as often put in of gold as of any other tint.*

I mention this particularly, because there is, I know, a feeling suggested probably by the theory that blue is the most retiring of colors, that this brilliant blue ground had the object of giving an effect of distance to the vault, and that it was so used. Now I quite believe that if the architects of old wanted their buildings to be higher, they would have built them so at once, and (which is more to the purpose) I do not believe that they would have got their extra height by this blue, even if they had wanted it. I believe more, that although pure blue may be the most retiring of the primaries, it is beyond all secondaries the least so.

This question is one of no little consequence in decoration, so I must ask your consideration of it for a few moments. My own attention was first drawn to it by having tried, relying without thought upon the theory, a deep blue coloring upon the railings of a long range of galleries, and I was perfectly surprised at the intensity with which its lines came forward. By a change to green they were thrown back as far. It wants no great search to get examples. Try any picture of the early masters and see how prominently the blue stands forward; or, if you want a larger and more modern instance, look at the deep broad lines of blue which circle the two great domes of Capt. Fowke, and see how they start forth beyond the red and the green beneath. Or, see in the next bright sky how the vivid blue above you tones in the distance to a grey, until it almost (sometimes *quite*) blends with the distant hills. That heavenly clear blue, that in warmer climates tints so lovingly the distance, and was scarcely, if at all, intensified by Martin in his wonderful landscapes, brings ever *nearer* to the eye those distant hills he so loved to paint; and many a time have I been almost startled at the unearthly clearness with which the far off scenery has thus been clothed.

I do not say that under certain conditions of light the retiring effect may not, perhaps, be found, though not with the *bright* blue to which we are now accustomed. What I object to is, the rule that would make it *always* so; and to put the case as plainly as I can, I will instance the very strongest case of a retiring tint that I remember. It was in a church near Parma, where a dome had been designed but left unfinished, and a flat ceiling thrown across a little above the springing. This ceiling was painted a raven black, and so complete was the deception that it was some short time before I discovered it. But, then, the light near was gradually subdued, so that all around this ceiling wore a darkened look; and only think of taking this instance as a rule, and trying it in a lower building in a bright light. And so it is, it seems to me, that the deep blue ceiling and the sparkling stars were used by the old artists as conventional forms of finishing their work, as leading the thoughts to the bright blue sky, and the things for which to hope beyond.

But I must enter a protest also against the intensely bright blue now commonly used. The old glass painters, where a blue was wanted as a back ground, used nothing but a blueish grey. This, too, was the old coloring of the artists. It may be seen well in those Egyptian drawings kindly lent to me by Mr. O. Jones, and the modern tint is painfully prominent in comparison when used in large masses.

In all the cases that I have cited I have relied upon the knowledge possessed of them by most, if not all, of my audience; I have not, therefore, thought it necessary to describe them in detail.

A few words now as to the Tints. There can be no doubt whatever that the chief thing to be considered is *contrast* in color. Put, for instance, a light green pattern on a dark green ground and the effect will, probably, be good; strengthen the contrast by some spots of red, or of sparkling white, and the contrast is stronger and the effect more brilliant. Outline in gold the dark patterns, or mark round the light ones with black, and your contrast is still stronger and still better. But the strength of the ground color and of the contrasts must depend upon the position.

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* In S. Denis the stars were in some compartments put in with white instead of with gold, and with a very good effect.

I have, I believe, myself used gorgeous coloring of intense depth, on a scale larger perhaps than most architects, and I never heard the effect called gaudy; but the tints were all, to some extent, neutral, and the large masses far away from the eye; put them nearer and the eye would be at once fatigued. In smaller rooms, then, it is safer to let the ground be of some light reposing tint, and to get the contrast by some bold panellings or border of a greater brilliancy and depth. Don't be afraid of gold. It's very safe, though very costly. As to the minor details of color and its contrasts we have no time to enter, and they are things that in my humble judgment cannot well be taught.

Let me now ask your attention to a few of the main results of our investigation. In the first place it is clear that the general scheme in former times was to heighten the decoration gradually from the floor to the roof. This was invariable, and not only so in the time of the old mosaicists, but in the works of their successors, whether the roofs were groined or open timbered; of the architects of the Renaissance, of whose interiors the ceilings form the chiefest glory; and of their Elizabethan brethren; of every time, in fact, almost, except our own. And this, not merely in their great abbeys and splendid halls. I have brought these forward, indeed, as examples, they being, of course, the strongest cases; but they are only the *strongest* instances of an universal law, which, until now, applied to the mansion as well as to the palace; to the parish church as well as to the abbey. It seems an obviously simple scheme, yet how utterly different is it to our present mode of working—to our modern plan, redolent of the upholsterer, of flaming carpets, insipid walls, and naked ceilings. I shall, however, be told, that with our small, low rooms, richness cannot be attempted in the ceilings without bringing them down too low in effect; and that, for the same cause, the ceilings must be flat and covings forbidden. Now, I much doubt whether the present system of flat ceilings meeting the walls at direct right angles do not produce in effect, to some extent, the very want of height which this arrangement is meant to remove, and I will give an instance which I have met with in my own practice, on a somewhat large scale. It was a private chapel, which had to be enlarged from 26 feet (without the chancel) to 69 feet in length, the width being 45 feet, but, owing to there being a very large room over, which could not be removed, the height was restricted to 29 feet. Even at the original size the chapel was thought low, and yet the necessary enlargement, and also the room over, were facts. I ventured to suggest this, as a solution. I really cut off from the walls, by sloping down the ceiling no less than one-sixth of their height, my idea being, that the eye in following up the line of wall and meeting with the ceiling at right angles, was, as it were, struck back and depressed; whereas, by cutting off the angles, the eye would be, I thought, led gradually up, and thus the whole part canted off be added, in effect, to the height. It was rather anxiously that I watched the result when the scaffolding was removed, but there could be no doubt whatever that the experiment was thoroughly successful, and that it is not absolutely necessary, even in a somewhat low room, to make the ceiling one large flat mass. But, then, the architect and the decorator must be of one mind, or the walls and ceiling may be differently colored and the effect be worse than ever.

Again, in every period of art, so far as I know of it, except our own, the pictures or the sculpture were made to form an integral part of the decoration. The old mosaics were all pictures, We know that Cimabue, Giotto, Masaccio, all worked on the walls themselves. We know that our old churches have upon their whitened walls painting to an extent almost beyond belief. We know that, in the grandest examples of later date, as in the Hall of Velasques at Palermo, the Halls at Venice and at

Rome, the Loggie at the Vatican, and many a fine old mansion here, art of the highest kind made all else accessory to it. Scarcely do I remember an instance to the contrary until a late period; for the easel pictures, now seen in the grand galleries, were mostly painted to fit some specified position. This rule, too, was not merely for the buildings of the great. Our old panelled rooms held many a gem of art, well fitted in, or on the panels, or carved on the massy chimney piece. Our present rooms contain, perhaps as well, the picture or the carving, but hung up against the walls as though for sale.

But most of all has the practise lapsed of the one mind that designed the building, large or small, leaving the decoration to another; and, until the architect himself lead all throughout, no lasting improvement can be made. It will be in vain to hope that the architectural lines will be followed, the general tendency of their design worked out in the decoration, unless the thoughts of the architect be turned to it from the first, and he be imbued with the spirit of the artist. Look at the grandest public halls, perhaps, existing—those by Palladio, and the Ducal Palace at Venice, and that by Sangallo in the Vatican. They hold the paintings of Tintoretto, Paolo Veronese, and da Voltera; those paintings are seen as well as any can be, yet the frames which held them, all the accessories to them, have been so planned for them, that architecture and painting go hand in hand with an effect which those who have seen it will never forget. Imagine the change if these paintings had been hung, as now a-days, by some ropes away from the wall! But in the old time, architects were painters too; Giotto, and Cimabue, and Raphael, and Romano, when they worked on their far-famed decorations at Assisi, the Vatican, and Mantua, only completed a work which, as architects, they thoroughly understood. It is partly because we have neglected it, though chiefly, no doubt, from the want of the public taste, that our decoration has lapsed into a trade. And it will not do for a mere artist to attempt it, even though he be a very artist architect indeed. Remember how Verona, Tintoretto, and others, undertook to design the great mosaics in S. Marc's nave, and how inferior is their effect compared with that of the grand old figures of their old masters. An architect should have the breath of the artist in him before he tries hand to color, but no artist must try it, be he ever so skilful, if he be not too a thorough architect. And, least of all, should the work be committed to the care (as now-a-days is too much the practice) of those who are neither the architect, nor the architecturally trained artist.

To consider, now, briefly, the subject of *External Decoration.*

In this we must, I think, make two divisions, viz., Town and Country. In the town all is artificial; but in the country the work of the architect is brought face to face with nature, and he is a bolder colorist than I am who would venture, in our present infancy, at least, of art, to do little more than use there carefully and with reserve the natural materials of the construction.

Many exceptions to this view can be produced, no doubt—the Campo Santo at Pisa, and many an arabesqued arcade by such men as Raffael and Romano. In modern times we have the Thier Garten at Munich, the portico of the Museum at Berlin, and in our country one (the only) example, that of the Royal Exchange, decorated at the instance of our President, Mr. Tite. But in these covered ways the effect is almost that of an interior, and the ceilings and upper parts of the walls are in deep shade. But in town the whole of the accessories are artificial, and all against the colorist. The wind and the rain, which, in the country, tint so beautifully well the stone, and cover it with lichen and with moss, do little more for us in town than print upon it in sombre colors the mark of our smoky fires; the yellow brick fades to the most dingy brown, and even the fiery red tones down to a sombre neutral hue.

The most ardent opposer of colored exteriors could scarcely see, with pleasure, the long, flat range of soot-stained fronts which line the streets from Portman to Bedford Squares, and one must be clever indeed (in a peculiar way) to add to, or change them, in any which shall not be an improvement. But I doubt, much doubt, whether, even there, it would be well to use other than colored *materials*, colors which carry a feeling of solidity with them, as opposed to the mere surface decoration of paint or fresco. I call to mind, at least, no instance of the latter being used with any great success. Munich is the strongest modern instance, and I know no one who seems to think that the attempt has there succeeded; and I doubt if any one would sketch with zeal, or with intent to study, the painted decoration which covers much of the plastered palaces in Italy. We have, I know, the Greeks against us (don't be frightened, I am not about to jump or take you into *that* gulph). But then in the East the coloring is so vivid, so totally different from ours; and we know so little, though we guess so much, of what was actually done, that we can scarcely argue well upon it. One thing, however, is quite clear to all who have seen a modern building of the Pentelic marble, viz., that the glare of its white, in that brilliant sun, is so intense as to make a toning down of it, by some means or other, quite a necessity. But I doubt (I hope our Greek friends will pardon me) whether the men who could design so exquisite a work as the Parthenon or Theseion, would not rather take the lovely and vivid coloring with which nature has now clothed the marble of the temple by the Ilyssus—coloring in parts so vivid as to seem at first like the work of art, in preference to the most brilliant red or blue or golden stain, with which they could adorn them. But, be their coloring what it may, we shall, I think, in the infancy of such work with us, be safer to trust to solid materials *alone.* We have enough of them; and from the earliest to very late times, enough examples of their use. The mosaics of Orvieto and Sienna, the marbles of Florence and Pavia, may be too costly for us (though even these materials have been used, and used lately, amongst us); but we have, and may freely use, our different colored bricks and stones, our granites and terra cotta, our colored tiles and our English marbles, all safe, honest materials if used well; but a very little thought will show that there is cause for study in the use even of the most common of them. What can be more pleasing than the tone of the deep colored red brick? Yet think of the wretched look which a whole town of red-brick houses has. How we long, in one of our northern red-brick, red-tiled heaps of ugly houses, for a green tree, or a rough-cast house, or a bit of timber framing. How valuable, as a relief, is a colored blind, a few flowers in a window! And how almost grand an air do a few stone mouldings give to a house in such a town, by comparison. This was felt more keenly, perhaps, in former times than now, and I quite believe that the queer cross hatchings, which score, diagonally, the faces of our old red buildings, were meant to tone, by their black lines, that same bright red; and that it was the color, not their outline, that was studied. But be the color what it may, there is one great difficulty to contend with at the outset—viz., the brightness of the materials at first, and their fading hues as time wears on. This difficulty has not yet been met, nor will it be until we get a better class of bricks to work with; bricks that will clean without the painter's tool and brush and scaffold.

Of all the bricks that we use I suppose that the common stock is about the least effective; and I know no work which shews that they and the red brick can be used together well without the black. Without its strong help the coloring looks weak and ineffective, still weaker and more ineffective as time goes on. Neither have I been able to find any successful combination of white bricks with the red: the contrast is too sharp, too staring. But the grey stock with red, outlined in black, or, still better, red bricks, outlined in black, with a few stone mouldings, and perhaps a few mosaic ornaments in tiles, give us a means of working out a bold and effective style of color, at a very slight cost indeed. But there is much to learn in the management even of these simple materials; and there can be no doubt that the boldest examples for us to study next to the red brick of our own country and of the South of France are those of Italy. There the colored stones and marbles are common as our bricks; and for this short paper I prefer taking their boldest uses as my examples.

We see them, then, constantly used in alternate colors in the arches of the doors and windows, and in the panels of the façade; as in the famous Campanile at Florence, of which I shew you the beautiful drawing lent me by Mr. Street; and I hold that their use there is effective, and quite legitimate. They tell, in fact, in precisely the same way as would enriched architraves or panels, and merely supply (often very effectively and well) the place of the enrichments. In the same way, too, we find them used in many of the bold doorways of the Cairo Mosques, and there, likewise, telling well. But another way, common both to Italy and the East, is open to greater cavil at its use, and greater risk in copying. I mean those stripes which we commonly see, as at Monza, Genoa, and Sienna, and in the drawings of the Caireen buildings, of which several have been kindly lent to us by Owen Jones, cutting horizontally across the fronts. No one can deny that, in some instances (to my mind very few), these horizontal lines of alternate colors have a not unpleasing look, and that they mark in a most bold way the contrasting lines, upright or curved, of the façades. But there is so much harshness in the effect usually resulting, so great a cutting up of the general line, that I cannot help agreeing, as a general rule, with Professor Willis, and should be loth to say anything that may support their use with us. Generally I would suggest, as a safe guide (safe, at least, with us, now feeling our way towards true principles) that where you would put a molding, you may substitute a colored band; where you wish to enrich a front, color may supply the place of carving; and, in the place where richness is most required, a few mosaic tiles, or a little polished marble, will work wonders in effect at a very little cost. Not that I would suggest that color may, as a rule, supply the place of moldings or of carving, but that you should not attempt to put the color unless in a place that you would have, otherwise, marked with some bold relief.

One thing, in respect to external decoration, is likely, I think, to effect much good, viz., the necessity for the coloring being studied by and committed to the charge of the architect himself, who must work it out in his own mind as he sketches the outlines of his work, and not merely frame the skeleton, to be clothed with color by some other hand. Still more should this apply to the internal coloring. Many there are amongst us whose repute is such, their talents so well admitted, that the finish of a building is handed over to them as a thing of course. But this is the exception, not the rule; and so long as the want of taste in the public, or a diffidence, or a want of knowledge (perhaps they are synonymous) in the architect, shall hand over the finish of all but our largest works (some even of our largest) to the care of other than their designers, we can scarcely expect a successful result. But I hope for better things. The public will now, I think, scarcely tolerate that our works should remain in the chaste simplicity that characterized those of the last century; chaste in the sense of a wicked friend of mine, who saw with me some nuns in Rome, and pronounced that they must be chaste, for they were so villainously plain. And when the use of colored decoration becomes a fact, it must follow, if we do our parts, that the architect shall be as well the decorator, and we shall see him finishing our buildings, hand in hand with the artist and the sculptor, as it was in the times of old.

The PRESIDENT said he saw so many of their friends who were competent to speak on the very interesting subject of Mr. Lewis's paper, that he was disposed to invite discussion upon it. They were indebted to their friend, Mr. Lewis, for the boldness with which he had spoken, and there were some very learned and experienced persons present who, he hoped, would say something on the very interesting topic Mr. Lewis had introduced.

Mr. DIGBY WYATT, Fellow, expressed his conviction that the subject of the paper could not be otherwise than interesting to every true artist. The prism had, Mr. Wyatt said, been referred to with great propriety as the original solvent of light, guiding us, by the phenomena which attended its decomposition, to nature's own scale of chromatic equivalents. Hence anything connected with the history of the earliest investigations into the theory of color, as connected with the prismatic spectrum, was of considerable importance. Many present were not probably aware of the existence of a work on the subject of light and color by the Hon. Robert Boyle, the illustrious father of the Royal Society, written and published when Sir Isaac Newton was only twenty-two years of age, and consequently several years before the subject was taken up by the latter. That volume, which had now become rare, Mr. Wyatt had brought with him for presentation to the library of the Institute. It was printed in the year 1664; and both from the truly Baconian process of experiment, and the importance of the phenomena it detailed, it could not have failed to guide Sir Isaac into the path he subsequently trod with so much honour to himself and benefit to the cause of art and science. Mr. Wyatt then referred to passages in Boyle's work (which he handed to the Chairman), in which various experiments with the prism, and speculation as to the nature and relations of light and color, were fully set forth. He proceeded to observe that one of the most interesting sections of this essay was that which treated upon white and black; and as in those portions of his work which dealt with light and colors, Boyle had anticipated (though of course in a somewhat vague manner) Newton's line of study; so in the experiments detailed with reference to black and white, he had shadowed forth several conclusions analogous to those at which Göethe has subsequently arrived, and by putting forward which in his "Farbenlehre" he had endeavoured to assail the Newtonian theory. Mr. Lewis had, perhaps, scarcely done justice to the inestimable labours of the late Mr. Field, to whom the artistic world was indebted, not only for the chromatic experiments and theories which had been alluded to, but for the really philosophical analyses upon which the values of all our most important pigments were based. Error had been created rather by those who dogmatised upon Field's scale, than by Field, who had originally framed it. For instance, although it might be safely asserted that a want of harmony of color could scarcely exist when Field's scale was strictly adhered to, it would be to change that scale from a helpmate to an unreasonable tyrant if it should be declared, as it had been, that delight to the eye could scarcely be produced by color, excepting within the range of his scale of equivalents. There existed an infinite variety of inflections and deviations, greater or less, from Field's scale, answering, perhaps, to keys in music, whereby delightful relief might be afforded from the possible monotony which would be engendered by working in one key alone, although possibly that key might be the fullest and most perfect. Just as delight was produced in music by tune, or passage from note to note with varied, graduated, and even unexpected intervals, with melody, but without harmony, so in chromatics the eye might be enchanted with the succession of tones of color skilfully graduated, without imperatively demanding the presence or propinquity of those equivalents essential to complete the full and perfect chord delighted in by Field and Owen Jones—the greatest teachers, with Chevreul, of the art of harmonious coloring who had ever lived. Precedent, though no less essential to be studied than dogmatic theory, had also its peculiar snares. Memory is treacherous and time ruthless. Sometimes the charm of a particular monument, highly colored, is really due to some other quality than its polychromatic treatment, and to imitate the latter would be fatal. Sometimes the recollection of the beautiful effect of some colored decoration, which may have been admired, is tinged either with the happiness at that particular moment of the spectator, or with some lingering gilding of a waning sunlight, making beautiful for a moment only—at other times the original designer of a scheme of colored decoration would utterly repudiate the lesson to be gathered at the present moment from the monument decorated. Thus the Pompeian painter would tell that the sulphur had acted on all his pigments, the reds and yellows particularly; the fresco painter would declare that the lime had eaten away his greens and reds, and spared some other tints which he had never meant to be conspicuous; the painter in oil would declare that his colors had sunk to poverty, while his oil and varnish had yellowed till brilliancy was utterly lost in what connoisseurs term "mellowness." In any case the danger of the abuse of precedent is very great. Hence it is all essential that the student should cultivate his eye until he might at last depend upon its almost instinctive appreciation of color. He must learn not only to recognise the precise value of a tone, when he sees it, but he must learn how to match it. To acquire this power no practise was so excellent as sketching from nature; no one but those who had worked hard knew how much patient observation was required to see colour in light and in darkness. At first the senses appreciated all light in nature as misty white, and all shadow as misty black. Gradually the eye recognised the faint hues of vivid light, and the incessantly varying low tones of shadow tinged by reflection acting on local color. The student would next have to observe how far the color of the light acted by simultaneous contrast upon the color of the shadow, and ultimately, when called upon to decorate in color, he would find all his experience so acquired invaluable in instructing him as to the precise hues necessary to be applied to each individual surface in order to impress a delightful picture upon the eye under every changing condition of "chiar' oscuro." Mr. Wyatt, while complimenting Mr. Lewis upon the care and earnest spirit in which his paper had been written, fancied that he had heard an expression used liable to misconstruction. It would be dangerous ever to look upon color as a substitute for form. Its special function was to enhance and show decorative form, and never to take its place. Thus the disposition of the lines of ornament upon a moulding should be entirely determined by the contour of that moulding; and indeed, unless form and color were made to work invariably hand in hand, architecture would be deprived of one of its most delightful sources of beauty. Mr. Wyatt concluded his remarks, not because there was not much more to say upon the subject, but to make way for those who might be better able to discourse upon the theme than he was.

Mr. Owen Jones, V.P., said his friend Mr. Wyatt had rather anticipated what he had intended to say in reference to Field. Mr. Lewis, in his paper, appeared to undervalue the experiments of Field. Now, he (Mr. Jones) had derived the greatest benefit from the labours of Field, and should ever reverence his memory. The rules laid down by Field he thought, if properly understood, would certainly be found both sound and useful. Field had shown by experiment that white light was composed of yellow, red, and blue, in the proportions of three, five, and eight. Of course, in practice, it would be impossible to ascertain mathematically when these proportions existed, but it would always be a safe rule to have as much blue as of red and yellow put together, thus letting the light and the shade balance each other, and on the light side to have rather less of yellow than of red, the yellow being the most powerful and light-giving of the two; thus the rule of three, five, and eight may very well represent the proportions which it is desirable to obtain. But after all, what are blue, red, and yellow; in none of the specimens on the walls exhibited by Mr. Lewis are these colors to be found. Blue, red, and yellow are mental conceptions, they cannot exist as visible colors; they rest as it were on a knife edge. In red, for instance, on the slightest departure from the mental color, you have purple red on the one side and orange red on the other, and so with the other colors. In fact, the management of colors depended partly on instinct and partly on experience, but it would always be found useful to have in the mind some general rules, such as those of Field, which when properly understood he considered would be found to be safe guides.

The President said he saw they had the advantage of the presence of a guest, a very distinguished friend, who had practically shewn that a very ugly thing could be made very pleasing. He wished Mr. Crace would tell them the secret that guided him in the particular experiment of decorating the Exhibition building, and which was so evident in all he undertook. He never saw such a change wrought in such a mass of materials, and so beautiful an effect produced as in the case of the Exhibition building. If Mr. Crace could show them what guided him, whether the "three, five, or eight," it would be very useful.

Mr. Crace, Contributing Visitor, said he must first of all return his most hearty thanks to the President for the great compliment he had paid him; the conduct of a large work like that alluded to was no doubt attended with much anxiety, but it was no small reward to hear his labour so handsomely appreciated on the present occasion. He would also thank Professor Donaldson for the honor he paid him at the opening of the Architectural Association. Returning to the subject for consideration, he thought that after what had been so well said by Mr. Wyatt and Mr. Jones, there was little left for him to speak of, without being guilty of repetition. Given the colors that range between white and black, the actual tone of those colors was nothing, it was what they were made to appear by due application of proper contrasts. The colors yellow, red and blue, in the due proportions which Field and other writers have expressed, mixed with white produce a grey, which is identical in tone with the grey produced by mingling black and white,—a very practical proof of the soundness of the philosophic theory. Color, as Mr. Wyatt had well said, was misapplied if it did not define form; for, indeed, the most important object of coloured decoration was to give expression to the particular forms intended by the architect. As regards the disposition of the colors, it was important not to bring masses of equally bright colors into juxta-position, unless properly separated; it is always better to have one retiring, the other dominant. The green leaves of plants vary considerably in tone according to the color of the flower they bear. But in nature the laws of harmonious coloring are constantly modulated by peculiar touches which restored harmony to most heterodox combinations. Mr. Lewis had brought before them many beautiful examples. In that most elegant Campanile of Florence the main lines were brought out with singular grace and elegance by the introduction of the red and black marble. The specimen of colored decoration from the Cathedral of Messina was truly beautiful. Again, that fine example from Assisi, where colored decoration reigns supreme, but gives infinite beauty to the architectural forms superior to what relief ornament could have ever produced. There was one subject in color on which Mr. Lewis had not touched, and that was the discords. Much might be said on these, which afforded play to the higher excellencies of the art, such, for instance, as green on blue, or brown on red; these discords properly managed produced the most beautiful combinations of color, as in music the sweetest and wildest melody. He would not now detain the meeting by alluding to the Exhibition Building; he had difficulties to encounter there, but he did his best to produce lightness as well as richness of color in the roof, but below he felt he was bound to subdue his coloring, with due regard to the purposes of the building. Noticing the colored drawing of an Egyptian capital, he doubted if the blue there was so full as that color was generally used by the Egyptians; he had not had the good fortune to visit the country, but he had been informed that at Philœ, and the later works, the blue was full in color, although not quite so bright as our modern colors, from want perhaps of chemical knowledge to produce them. He saw no reason why the blue in this capital should be made so grey in tone, on the contrary, he thought there was no reason why it should not balance better with the red. He would not longer detain them, and begged to thank them for their kind indulgence.

Mr. G. E. Street, Fellow, having been called upon by the Chairman, said he thought there were two lines of observation that might be taken in the discussion of Mr. Lewis's very interesting paper. One (which had already been taken) was as to the composition of pure color, and the laws which regulate its proper use; and the other was the still more important question,—how color was to be introduced in buildings, and how far the works which they as architects designed were calculated to develop the colored architecture which Mr. Lewis desired to see. There was one remarkable fact which must have struck most of those who heard the paper read, namely, that Mr. Lewis's examples of good color were taken from buildings erected before anything was known with scientific accuracy of the composition of color, and all the bad examples which he adduced from buildings erected after that date. The fact was the more striking, because it was evident that Mr. Lewis had not selected his examples with any such object. It did seem to be the fact that the more men knew as to the so-called laws on the subject, the less were they able to succeed in the practical application of their knowledge; and whilst all the good colorists of the present time seemed to be from one point of view only half-civilised, we, whose civilisation consists so largely of a cheap diffusion of knowledge, penny newspapers, and so forth, were unable to succeed in it at all; and were indeed ruining the manufactures of the East by the introduction of our own canons of taste in color. He sympathised, therefore, with so able a paper as that of Mr. Lewis, the object of which was to call attention to the subject of colored decoration in architecture, attention which ought to be bestowed upon it, and which architects above all men were bound to bestow. They must not, however, be too sanguine; for he supposed it might with truth be said, that no age had ever produced half a dozen good original colorists in any one country. It was possible that those who practised colored decoration might produce certain effects by following certain rules, but he was afraid that dogmatic rules were a great snare and stumbling block, and that really good work was produced as often by a contempt for rules as by obedience to them. As to the question of constructional decoration, it was too late in the evening to enter upon so large a subject. He might say, however, in reference to Mr. Lewis's objection to the coloring of some Italian buildings, that at Orvieto, Sienna, and elsewhere, the thin lines of dark marble were introduced to give excessive definiteness to certain important architectural forms. They were introduced, for instance, at the springing of the windows and of the doors under the string-courses, and in other parts of the structure, where it was desirable to give the greatest possible emphasis to the effect: somewhat, in fact, like the office fulfilled by our London smoke for the south front of St. Pauls, where the soot had settled in the most effective way under all the leading lines of the work. Referring again to Italian examples, he thought that if he might venture to criticize any thing so perfect as Giotto's Campanile at Florence, he should say that the window panels in the two upper stages were too much separated from the rest of the work by the strong dark line within which they were set, and it always appeared to him that it would have been far better if the horizontal coursing which was so finely introduced in the lower stage had been sparingly adopted in the upper also. As to the modern attempts at constructional color in our own country, he feared it was impossible to speak with much pleasure. In modern works there is no doubt plenty of color, and of a very novel kind: but whether it was as good as it was novel was quite another thing, and he for one doubted it. The truth was, that a little more care, study, and attention to the subject would be attended with the greatest advantage, and indeed no architect should venture on such work without personal study of ancient examples. There could be no doubt that old architects used every material that came conveniently to hand, and were never deterred by the very positive color of a material from using it; as, for instance, in volcanic districts, or those in which black and white marble were abundant. In those days the means of obtaining materials from a distance were very limited, but he took it that now they might lawfully consider themselves citizens of the world, having the means of going with comparative ease to any part of our own country, aye, even to any part of Europe, for materials which might be needed for the accomplishment of our objects. We might use stone and marble tiles, and, in fact, almost any material in England at the present day. He hoped architects would only design colored buildings after having first paid attention to the colored buildings designed by other men, but this could not be done successfully except by developing a real love of color for its own sake, which might exist without much knowledge of rules, and was, in fact, very much a matter of instinct.

Mr. JOHN P. SEDDON, Hon. Sec., agreed with the views put forward by Mr. Lewis generally, and defended what he had said upon the subject of the color blue in particular; he thought that the subdued blue seen in the capital that had been referred to, whether Egyptian or Roman, was quite strong enough for decorative purposes generally, and far preferable to the crude raw blue used usually at the present day; in fact, one of the great defects of modern coloring was its rawness and crudity, whereas in nature, as in good art, the general coloring is *neutral*, heightened by contrast in parts only. The use of the horrible French ultramarine, constantly employed, should be prohibited entirely. Raw blue backgrounds were the ruin of almost all modern stained glass windows, which the simple substitution of a dark blue grey instead would go far to redeem. Referring to the effect of the background upon stained glass, it was said, but he did not speak from his own knowledge, that the effect of the noble transept windows of York Cathedral had been much spoiled by greenish glass having been placed outside them, which destroyed the harmony of their color. [Mr. M. Digby Wyatt confirmed this statement.] Mr. Seddon, in continuation, said that if Mr. Lewis were to be considered a "heretic," he would be willing to join in the heresy of considering that rules for good coloring could not be laid down. As his friend Mr. Burges said, "An eye for color was the gift of the good God, and could not be acquired by rule or teaching." The best modern colorist, Mr. Dante Gabriel Rossetti, had painted many works in defiance of the previously generally accepted theory, that blue and green did not harmonise together. How such a theory could have arisen, seeing that nature indulged freely in green fields and blue skies, he could hardly understand. He thought, with Mr. Lewis, that the theory that color should represent the material it was employed upon was to a great extent erroneous. In some cases this had been of late attempted to be carried out in a manner which seemed to him almost ludicrous. The colors used in the Hereford iron screen had been confined unnecessarily, as he thought, to such that the material itself could assume under different circumstances, as when cold, red-hot, white-hot, or when oxydised, &c. &c. In coloring, two things ought to be striven after—*breadth* with *variety*. The best ancient stained windows, *e. g.* those at Florence, Chartres, &c. had broadly massed colorings, yet infinite variety of tint in every breadth of the the same general color; whereas, modern painted glass was usually cut up into fragments of different color, losing all *breadth*, and yet these colors were all cut out of the same sheet of glass, so that there was no *variety* of tint.

The President thought they should all join in thanking Mr. Lewis for his very interesting and very curious paper, and for the pains and care he had bestowed on the lecture, as well as the learned and skilful treatment of the subject to which it referred. Mr. Lewis had paid much attention to the matter, and they were all much obliged to him for what he had advanced in his paper. Mr. Lewis said he thought that English architects ought to be permitted to decorate their own buildings, and on that subject it might be remarked that the French and German architects were always allowed to do so. He was quite sure they would all agree with him that what Mr. Lewis had said that night was of the greatest possible interest, and of the greatest possible value. As to Egyptian coloring, that coloring might be traditional, for he believed that one of the buildings which had been referred to, was a temple as late as the time of Diocletian. There was a certain amount of Egyptian taste and Egyptian feeling in it, and we were too apt to imagine that Egyptian architecture (*sui generis*) was an architecture of one period, whereas, it ranged through such an enormous time that we must receive with care all that came from Egypt. "Sharpe's History of Egypt" was a very remarkable and useful book, and in it the author gave the names of the Emperors who had built those temples, including the one of very late date to which he had already referred. He would, if they permitted him, return their best and hearty thanks to their friend, Mr. Lewis, for his very able and very useful paper.

Mr. Lewis, in returning thanks, said, as to Mr. Field, he should be the last person in the world to attempt to undervalue his labors. He had read all Mr. Field's work, and had paid special attention to the last edition, which was an admirable work, and shewed a true artist-like feeling and strong appreciation of the beauties of nature by the author. But he (Mr. Lewis) must say that the results of Mr. Field's experiments were so opposed to those obtained by other experimentalists, that even admitting that they really had any practical bearing at all on such a subject as artistic coloring, they could not be received as safe guides on which to base a theory; and that nothing could be in his opinion more dangerous in subjects concerning art than to lay down dogmatic rules without the very clearest proof that they were essentially correct.

THE RESTORATION OF THE CHURCH OF ST. MICHAEL PENKEVEL, CORNWALL.

By George Edmund Street, Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, Dec. 1, 1862.

I HAVE been asked by our energetic Secretaries to undertake the description of some work in progress just now under my direction, and, though with some hesitation, I have agreed to comply with their suggestion. I hesitated because it is impossible to speak freely, candidly, or properly, of one's own works: if they are good, it is the province of others to undertake the proof of the fact, and critics at the present day are undoubtedly rather apt to err on the side of leniency than of severity. If, on the contrary, they are not good, the less their authors say about them the better. But, hesitating as I did on these grounds, in the end I complied, because it so happens that I am able to describe to you a work which has now been for some little time in progress in a far-away village in Cornwall, where all that I have done has been carefully and lovingly to restore, and renew what had once, more than five hundred years ago, been built by pious hands, and afterwards in a less reverent age, in part been allowed to fall to decay, and in part been ruthlessly destroyed. The very obscurity of such a monument seems to give it more value, which is again enhanced when we find it standing almost alone in a large county, the pre-eminent monument of its age, and yet unknown, undescribed, and hitherto uncared for. I trust, therefore, that I may venture on the description of the Church of St. Michael Penkevel, without transgressing those bounds of modesty about the work of my own hands, which it were very unpardonable to forget. It is true, indeed, that all of us must form some kind of opinion as to the merits or demerits of our own works. The artist who never sees his own faults is never likely to avoid them; whilst the artist who is not conscious of the merit of his work—where it has any—is not likely to feel that joy in his labour, without which all labour is in vain, and all art unsympathetic and tame.

Such a subject as that which I have chosen may serve, incidentally, some good purpose, in that it will lead naturally to the consideration of some of those questions of Church arrangement, on which, as it seems to me, the minds of Church architects ought to be well made up before they undertake the restoration of an ancient building for the due celebration of all the Divine offices of the Church within its walls. We had, some months ago, a dissertation, and afterwards a discussion, on the question of the right mode of restoring and conserving our ancient monuments; and the right arrangement and right use of such monuments, when they have been restored, seems to be a very natural subject for discussion and consideration afterwards. I must, indeed, in passing, express a hope that the ventilation of this supplementary question may galvanize into life the committee which we appointed last session, and suggest to its promoter the advantage of taking some steps for bringing it forthwith into working condition. Since that committee was appointed one of the most ruthless schemes of destruction has been accomplished; and it is to an honorary member of this Institute, and not to our professional Committee, or to our Council, that we owe the most vigorous of the protests* which have been uttered against the destruction of the noble Guesten Hall, at Worcester, which has followed so few years after

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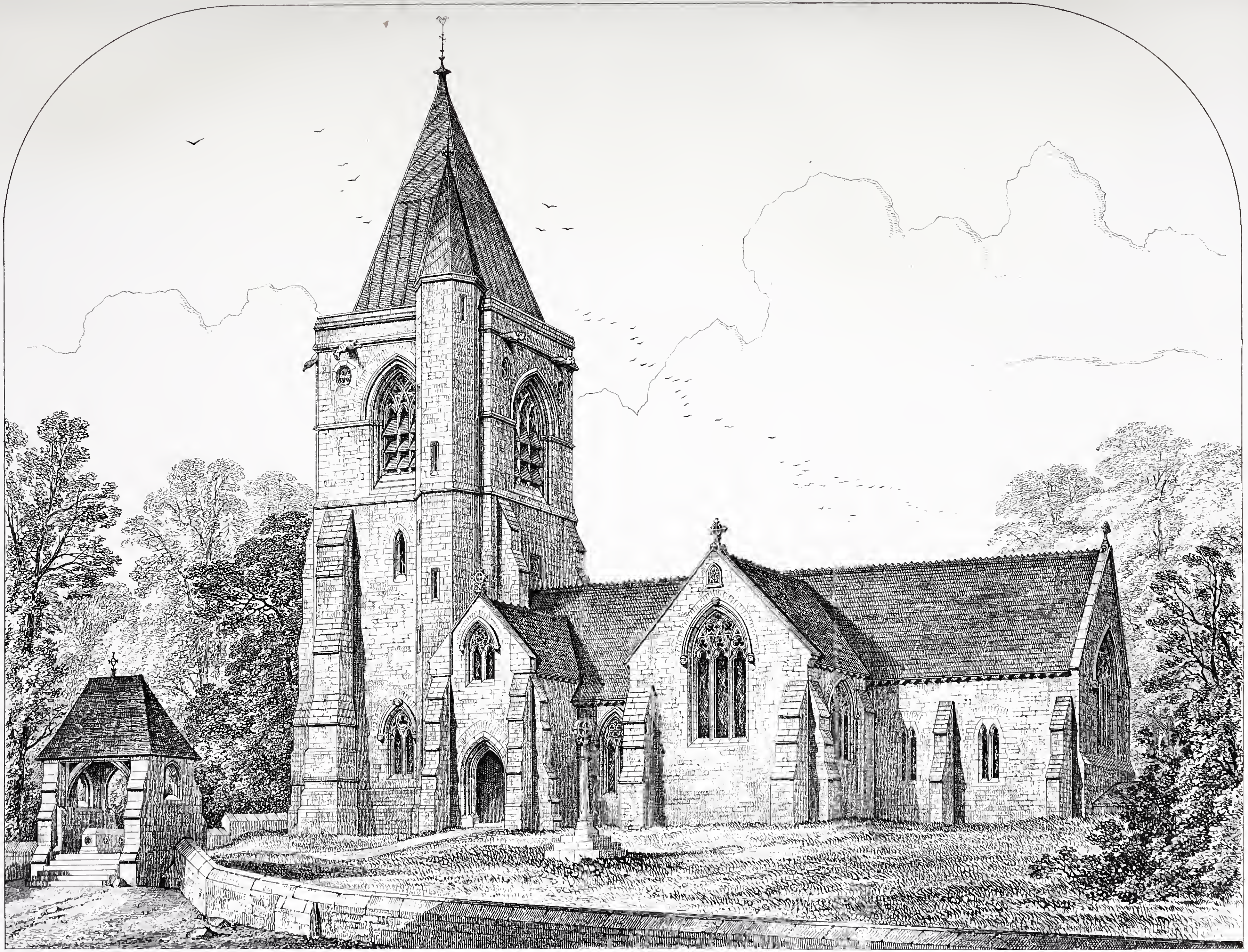
* The earliest protest was made as long ago as 1854, by a sub-committee of the Worcester Architectural Society of which I was a member. The Report which we drew up is printed in the Transactions of the Society, and is illustrated by some drawings of mine. But Mr. F. T. Dollman has illustrated it more carefully in his "Analysis of Antient Domestic Architecture."

Pl. 1.



G.E. Street, Archt.

J.R. Jobbins

Perspective View of the Church of S. Michael Penkevel, Cornwall.

the similar destruction of the Deanery Hall in the same cathedral city, and the fine Refectory at Malvern, that one is almost tempted to suspect the existence of a deliberate scheme for the Americanizing of that unlucky district by sweeping away all its old historic landmarks !

Many of us, fortunately, are able, as I am to-night, to give evidence that this carelessness about and contempt for our old monuments, are not universal. The Church to which I call your attention is the Parish Church of Lord Falmouth's seat at Tregothnan, and I have been entrusted by his Lordship with its faithful restoration, the only condition being that every old feature should be jealously preserved and carefully brought to light, and that additions to the old work should only be made where it had already been so far defaced as to make the attempt to restore the existing work a mistaken and useless labour.

It will be convenient first of all to give such historical illustrations of the fabric as are accessible, and then to describe its architectural features in detail.

The first record of the Church is that of its consecration by Bishop Bronescombe,* on August 13th, 1261, in honour of St. Michael. This is given by Dr. Oliver, in his Monasticon of the Diocese of Exeter.† At this time the advowson of the Church was attached to the manor of Fentongollan. This manor originally belonged to a family of the same name, from whom it passed by a succession of female heirs to the families of Trejago‡ and Trenoweth. It is to a member of the first of these families that most of the existing church must be attributed, though in the Chantry Rolls of Devon and Cornwall, among the records of the late Court of Augmentations, in the Record Office, there is the following statement, referring to a foundation here by one of the Trenoweth family :—" The Stipendarye called Trenouthes, founded by John Trenoweth [who had the manor of Fenton Galleth] to fynde a pryste to pray for his sowle in y^{e} Paryshe Church of Saynt Michell Penkevell : and he to have an annuall pencon of c^{s} and an obytt [to] be yerely kept at which everye pryst present shuld receyve vi^{d} for masse, with ij^{s} vj^{d}, to be distributed yerely amongst pore peple." The date of this foundation is not given, but John Trenoweth died in 1497. The work of the Trejago family is much older, as is proved by a most valuable deed, which Dr. Oliver has printed for the first time,§ executed by Walter Stapledon, the learned, pious, and martyred Bishop of Exeter, given in Exeter, February 7th, 1319, and endorsed, " Ordinacio Archipresbiteratus de Penkevel in Cornubia." This deed recites the Petition of Sir John Trejagu, patron of the Church of St. Michael of Penkevel, which says that he had, at his own cost, now recently altogether repaired the said Church,|| in which he proposed to found a Chantry

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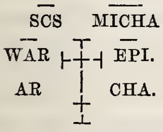

* Since this paper was written, the original foundation stone of the church has been discovered in the north-east angle of the Chancel; it is a piece of granite about five inches thick by two feet six inches square, and on one side is this inscription. This no doubt is the stone laid in the time of Bishop Walter Bronescombe, as the part of the church in which it was found was certainly not altered at the time extensive works were undertaken in the Episcopate of his successor Walter Stapledon.

† Monasticon Dioc. Exon. p. 66.

‡ This name is written Trejago, Trejagu, and Triagu.

§ Monasticon Dioc. Exon. p. 66.

|| I give the original of some portions of this deed :—" Oblata siquidem nobis domini Johannis de Trejagu, militis patroni Ecclesie Sancti Michaelis de Penkevel, nostre diocesis, que de nostro feodo existit, petitio continebat, quod cum in eadem ecclesia, quam suis propriis sumptibus jam noviter reparavit in totum, ob honorem Dei quandam cantariam quatuor capellanorum qui, in ipsa ecclesia divinis obsequiis jugiter intendentes, diebus singulis pro salubri statu nostro," &c., &c. " orare ac celebrare debeant," &c. The deed then goes on to endow the Archpriest with the emoluments of the living, and then, " Hujus modi vero archipresbiter sic ut premittitur institutus tres capillanos viros utique ydoneos et honestos de ipsius fundatoris vel heredum suorum assensu eligat et assumat, quos absque causa racionabili nolumus amoveri, qui preter horas canonicas et missam de die quas ab omnibus cappellanis in ipsa ecclesia seu parochia horis competentibus dici precipimus in communi plenum obsequium tam pro vivis quam pro defunctis, videlicet, Placebo, Dirige, et commendacionem ac tres missas pro animabus prenominatorum vel duas ad minus et tercia de Sancte Maria, in qua nichilominus commemoracionem pro dictis tam vivis quam defunctis fieri volumus in eadem ecclesia seu parochia, cessante impedimento legitimo, dicere cotidie teneantur uno

for four Chaplains, where perpetual prayers might be offered for himself and his Lady Jane, and his parents John and Agnes de Trejagu; for Walter Stapledon, then Bishop of Exeter; his brother Sir Richard Stapledon, Knight, and his parents William and Arabella Stapledon; for the king, for Simon and Lucy Trejagu, Stephen and Melora de Trewarthenick, and others. The proposal was approved and confirmed by the above Bishop, who erected the church into a collegiate one, and the head chaplain of the four clergy who served it, into an archpriest,* who was specially charged with the care of the parishioners. The archpriest's Socii, or Fellows, were to live under his roof, share his table, and receive from him yearly two marks, "pro stipendio et robâ suâ."

Soon after this, on the 4th of May, 1335, an Indulgence was issued at Avignon in favour of this church, and the original is still preserved in the muniment room at Tregothnan. Lord Falmouth has kindly given me a copy of this instrument, of which a translation will not be out of place here.† This Indulgence was found by that accomplished antiquary, the Rev. Lambert B. Larking, in the course of his

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semper, videlicet archipresbitero predicto, circa curam parochie et jura episcopalia et archidiaconalia cum oportuerit exhibenda summopere vigilante." "Ita tamen quod tam ipse quam alii capellani quos sibi socios appellabit in eadem domo simul cotidie se simul et similiter reficiant et habitent in communi." And, finally, that the Archpriest is to pay these fellows "pro stipendio et roba suâ singulis annis duas marcas ad duos anni terminos, videlicit, in festo pasche et Sancti Michaelis pro equalibus porcionibus."

* I do not know whether the appointment of an Archpriest is common. I find mention of one in Dr. Oliver's Monasticon at St. Michael's Mount, where it is said, there are "three Prysts to celebrate there, one of whom ys named y^e arch pryst." Bingham (Origines, Book II. Chapter XX. Sect. 18) gives an account of the office of the Archipresbyter, which does not tally with the office held in this church, which seems rather to have been like that of the Cardinal Presbyter, or, perhaps, rather the Deanery of a Collegiate Church. The first archpriest of St. Michael Penkevel, was the "Dominus Willelmus," mentioned in the Indulgence printed below.

† An Indulgence for forty days, for services in and to St. Michael Penkevel Church, dated 4th May, 1335:—

Universis Sancte Matris Ecclesie filiis ad quos presentes littere pervenerint.

Nos miseracione divina, Gorgia Fettrensis et Belluensis Episcopus,—Salmannus, Wormaciensis Episcopus,—Bartholomeus Clofensis Episcopus,—Bonifacius, Corvaniensis Episcopus,—Galganus, Laveriensis Episcopus,—et Raymundus Caphensis Episcopus,—Salutem in domino sempiternam.

Splendor paterne glorie, qui suâ mundum ineffabili claritate illuminat, pia vota fidelium de clementissimâ ejus majestate sperancium, tunc precipue benigno favore prosequitur, cum devota ipsorum humilitas sanctorum meritis et precibus adjuvatur.

Cupientes, igitur, ut ecclesia Sancti Michaelis Archangeli de Penkevel, Exoniensis dioceseos, in ejusdem Sancti Michaelis veneracione consecrata, congruis honoribus frequentetur, et a Christi fidelibus jugiter veneretur.

Omnibus vero penitentibus et confessis, qui ad dictam ecclesiam, in singulis ejus patroni festivitatibus, et in omnibus aliis infrascriptis, videlicet, Nativitatis Domini, Circumcisionis, Epiphanie, Parasceves, Pasche, Ascenscionis, Pentecostes, Trinitatis, Corporis Cristi, Invencionis et Exaltacionis Sancte Crucis, Nativitatis et Decollationis Sancti Johannis Baptiste, Beatorum Petri et Pauli Apostolorum, et Omnium aliorum Apostolorum et Evangelistarum, In commemoracione Omnium Sanctorum et Animarum, et in singulis festis beato Marie Virginis, et in omnibus aliis festis Sanctorum et Sanctarum, quorum seu quarum reliquie vel altaria in dicta habentur ecclesia, necnon a festo Sancti Michaelis in Septembre, usque ad festum Sancti Luce Evangeliste, et per octabas omnium predictarum festivitatum octabas habencium, et in dedicacione ejusdem, et in singulis diebus dominicis, causâ devocionis, oracionis, aut peregrinacionis, accesserint: Seu qui missis, predicacionibus, matutinis, vesperis, aut aliis quibuscunque divinis officiis ibidem interfuerint, aut corpus Cristi et oleum sacrum, cum infirmis portentur, secuti fuerint, vel in seratina pulsacione campane, secundum modum Curie Romane, flexis genibus sex Ave Maria dixerint,—vel dictam ecclesiam et ejus cimiterium, pro animabus corporum inibi jacencium exorando, circuerint; Necnon, qui ad fabricam, luminaria, ornamenta, aut quevis alia dicte ecclesie necessaria, manus porrexerint adjutrices, vel aliquid suarum donaverint vel legaverint facultatum, et qui ad sustentacionem sacerdotum ibidem celebrancium pias elemosinas dederint, aut fecerint, aut procuraverint, et qui pro dominis, Johanne de Triagu, milite, dicte Cantarie fundatore, ejus uxore et liberis, ac domino Willelmo, primo archipresbitero, oraverint.

Quotienscunque, quandocunque, et ubicunque, premissa, vel aliquid premissarum, devote fecerint,—de Omnipotentis Dei misericordia, et beatorum Petri et Pauli Apostolorum, ejus auctoritate confisi, singuli nostrum quadraginta dies indulgentiarum de injunctis eis penitenciis misericorditer in domino relaxamus, Dummodo Diocesani voluntas ad id accesserit et consensus.

In cujus rei testimonium sigillorum nostrorum presentes litteras jussimus appensione muniri.

Datum Avinione, iiij die Maie, anno Domini MCCCXXXV° et Pontificatus domini Benedicti Pape xij anno primo.

examination of the Tregothnan muniments, and I avail myself of his translation, which has never yet been printed. It is worth reading on account of the particularity in which these out-of-the-way bishops seem to have thought themselves empowered to deal with the interests of this little Cornish parish, and almost without reference to the Bishop of Exeter. The Indulgence is sealed with a noble seal.

" To all the Sons of the Holy Mother the Church, to whom the present letters shall come,

" We, by the Divine mercy, Georgias, Bishop of Feltri and Belluno, Salmannus, Bishop of Worms; Bartholomew, Bishop of Cl (?); Boniface, Bishop of Corvania; Galganus, Bishop of Laveria; and Raymund, Bishop of Caph (?)—Health in the Lord everlasting.

" The Brightness of the Father's glory, which illuminates the world with its ineffable brilliance, then more especially accompanies the pious vows of the faithful (who are full of hopes from his most merciful Majesty) when their devout humility is united to the merits and prayers of the Saints.

" Desiring, therefore, that the Church of St. Michael the Archangel of Penkevel, in the Diocese of Exeter, consecrated in veneration of the said St. Michael be frequented with suitable honors, and be continually venerated by the faithful in Christ.

" To all true penitents who have been confessed, and who shall attend the said church on each festival of its patron, and on all the other festivals below enumerated, viz., The Nativity of our Lord, The Circumcision, The Epiphany, Easter Eve, Easter Day, The Ascension, Whit Sunday, Trinity Sunday, Corpus Christi, The Invention and Exaltation of the Holy Cross, The Nativity and Beheading of St. John the Baptist, The Blessed Apostles St. Peter and St. Paul, and the festivals of all the other Apostles and Evangelists, The Commemoration of All Saints and All Souls, and on each of the festivals of the Virgin Mary, and on all the other festivals of Saints whose relics or altars are in the said church. Moreover, from the festival of St. Michael, in September, to the festival of St. Luke the Evangelist, and through the octaves of all the aforesaid festivals which have octaves, and on the dedication of the said church, and on every Sunday, for the purpose of devotion, prayer, or pilgrimage; or, to those who have been present there at masses, sermons, matins, vespers, or any other divine service; or who have followed the body of Christ, and the holy oil when they are carried to the sick; or who, on bended knee, have said six Ave Marias, at the ringing of the evening bell, according to the usage of the Roman Church; or who shall have made the circuit of the church and churchyard, praying for the souls of the bodies lying therein. Also, those who have held forth an assisting hand to the fabric, lights, ornaments, or any other necessaries of the said church; or who shall have given or bequeathed to it any of their means, and those who have given or done or procured pious alms for the support of the priests ministering there; and those who have prayed for Sir John Triagu, Knight, the founder of the said chantry, and his wife and children, and Sir William the first Archpriest there.

" As often, when and wheresover they shall have devoutly performed the premisses, or any of the premisses, of the mercy of Almighty God and the Blessed Apostles St. Peter and St. Paul, relying on his authority, each of us, mercifully in the Lord, release to them forty days indulgences from the penances enjoined upon them,—Provided the will and consent of the Diocesan consent thereto.

" In testimony wheref, we have ordered the present letters to be fortified by appending our seals.

" Given at Avignon, the 4th day of May, in the year of our Lord 1335, and the Pontificate of our Lord Pope Benedict the 12th, the first."

Mr. Larking also found a paper of complaints of the parishioners against one Oliver Carminowe put before counsel, with the opinions given thereon, circa 1590, 1610. From these it seems as if he had been churchwarden, and had refused to give up the parish property; for he is charged with having a chalice belonging to the parish. And again, in speaking of the "Aisle" (evidently the South

Transept), in which the Carminowe family used to sit, the complainants state, "In the foresaid Ile was an altar stone, which Olyver caused to be put on his father his grave." Opinion, "He must compounde with the Parisshe for it." And this stone is still in the pavement, marked with the five crosses—which proves it to be the altar stone—and with the letters J. C., the initials of John Carminowe. These Carminowes were descended from John Carminowe, of Resprin, who married the eldest daughter of John Trenoweth, already mentioned as founder of a chantry in this church. Thomas, son of the first Carminowe, was Gentleman of the Privy Chamber to King Henry VIII. John his son (according to Hals) "kept open house at Christmas for all comers and goers, drinkers, minstrells, dancers and what not, and his usual allowance of provision for those twelve days was twelve fat bullocks, sixty bushels of wheat, thirty-six sheep," &c. &c. His son Oliver Carminowe, who appropriated the old altar stone, squandered his estate of Fentongollan, and in 1603 Sir Nicholas Hals bought it, and of his family, Hugh Boscawen bought it in 1676, and "pulled down the mansion, with its lofty towers and fine chapel,*" which was dedicated in honour of the B. V. Mary. The other estates in the parish in time all came into the hands of the same family: Tregothnan, in the fourteenth century, by the marriage of Boscawen of Burian with its heiress: and the manor of Penkevel, which came from the Penkevels to the Courtnays, and from them to the Boscawens. The advowson, "together with some chantry lands," was purchased by Hugh Boscawen from John Hals.†

I hope I need not apologise for troubling you with this dry introductory matter; but it appears to me to be always important to fix the date of any ancient work, and here we are able to do so with what seems to be the most complete certainty; and it happens fortunately that the documentary evidence thus afforded tallies accurately with the architectural character of the fabric.

The plan of the church at present is cruciform with a western tower; and though at first sight the whole work appears to be of much about the same date, a careful examination disproves this. The original church, consecrated in A. D. 1261, had probably a nave and chancel only, and no transepts. The side chancel windows are, I take it, of this date, and there were some slight remains of the inside arch of an early window in the north wall of the nave, which was afterwards blocked up in order to insert a fourteenth century window. The arch into the south transept had also somewhat of an early look, but on careful examination and dissection, I found that its western jamb was made up of portion of a thirteenth century doorway, which is conclusive evidence of its not being original, and besides this, the transept wall is built against the nave wall, and not bonded into it. The walls of chancel and nave have a sort of plinth, formed by the sloping of the foot of the walls outside, a feature which is not seen in the transepts, tower, or porch. The whole remainder of the church was evidently altered and re-modelled just before the date of the instrument which I have quoted—circa 1300-1319—and some time before the Indulgence given at Avignon in 1335.

The whole scheme of the building was remarkable. In this small church, in order to provide for the four chantry priests, four altars were required. The first already existed at the east end; places for two more could be found by the erection of transepts, and for the fourth, that never-failing ingenuity which marked our old architects, was taxed, but not in vain. The large and stately tower was brought into use, and on its first floor, under an arch in the wall, the fourth altar was built, with its little eastern

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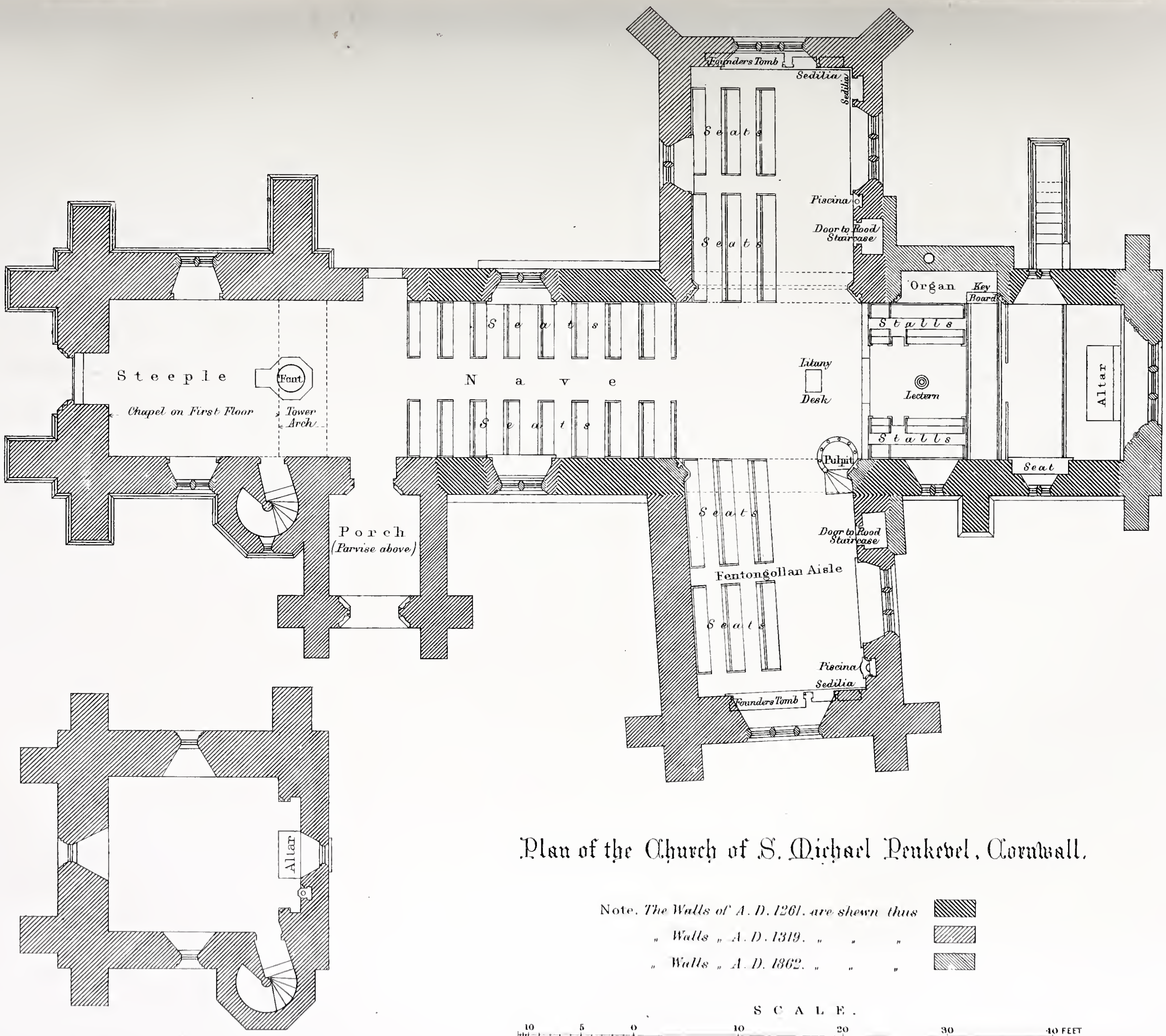
* "Fentongollan had heretofore upon its lands many large and commodious houses, as halls, parlours, and dining rooms, a notable tower and bell, three stories high and a chapel adjoining thereto for divine service, and two large gatehouses at each end of the town, which fabric the writer hereof hath often seen in his youth, when his grandmother lived in it," "but now, alas, all are pulled down and the chief stones carried to build the gates and houses of Tregothnan." This is Hals' account given in D. Gilbert's Par: Hist: of Cornwall, III. p. 209. But it can be only in part true, as the house at Tregothnan in his time was an antient mansion.

† Lyson's Magna Britania, Vol. III. p. 234.



Plan of the Church of S. Michael Penkevel, Cornwall.

Note. The Walls of A. D. 1261. are shewn thus ▨
" Walls " A. D. 1319. " " " ▨
" Walls " A. D. 1862. " " " ▨

PLAN OF CHAPEL IN 1ST FLOOR OF TOWER.

G. E. Street, Archt.

J. R. Jobbins.

window over it, opening just above the ridge of the roof. Over the porch was another chamber—probably the sacristy—entered from the same staircase that leads to the altar, and to the roof of the tower, and there were two staircase turrets on the east side of the transept, which led, no doubt, to the rood loft, and of which only slight fragments remained.

Subsequent to this re-foundation of the church, the alterations were generally for the worse. First, in the fifteenth century, the roofs were renewed, and no trace left of their original design. Subsequently, by degrees, the walls were coated with monuments to the Boscawen family, and others; some windows were blocked up, others, in part, destroyed; the east window was destroyed, piscinæ, doors, niches, &c., carefully concealed, the roofs badly repaired and under-ceiled, the upper room of the porch removed, and the tower lowered and shorn of its fine proportions, and finished in the way shown in my view of the building in its old state; the bells, with the exception of one (I think) sold; and, finally, the whole interior of the church divided elaborately into panels, with plaster mouldings, rosettes, and what not, until it looked like the outer hall of some dingy seventeenth century house rather than a church. Unfortunately the work was not only damaged, but in itself defective, the walls being almost all very badly built, and much of the wrought stone work decayed, and the tower in particular threatening the whole building with destruction.

It was absolutely necessary to do something in the way of repair, and it soon became manifest that the work was one which would be, at the least, as costly as, and far more troublesome than, the erection of an entirely new church. And it is quite open to discussion, whether, in such a case, restoration of the old or invention of a new work is the right course to adopt. It may fairly be said, where all must be, at least, more than half new, would it not be better for art, and better for the artist, that he should be encouraged to devise some entirely new work, washing his hands altogether of the men who, five hundred years before, had done their best, and only imitating the hearty way in which here, as so often elsewhere, the fourteenth century architects had swept away everything of the thirteenth century building that in the least interfered with their scheme, and given us nothing but their own handy-work?

But there were many and grave reasons here, why such arguments should not be listened to. The work had its history—and this is a much rarer thing than could be wished. Then, it was extremely good of its kind. Its kind was very rare in its own county, and it helped to illustrate, in many ways, one of the most curious cases of localism in art, with which I am acquainted. These were sufficient reasons for the course which we adopted, and since the work was commenced a succession of interesting discoveries has amptly justified our decision, and given me the groundwork for the most faithful restoration, in nearly every line, of one of the most singular small churches I have ever seen.

It is time now to give you an accurate architectural description of the building, which is, however, explained more completely by the careful drawings which I exhibit, than it can be by any verbal description. The church is now cruciform, with a western tower and south porch. There is not, and there seems never to have been, a chancel arch, and the tower arch springs from corbels in the side walls, and being of the same width as the nave, gives great increase of length to it. At the same time it is a defective arrangement, for so important a feature as a tower ought to be seen and felt, not only outside, but inside also. The south transept is set singularly askew: and I am unable to suggest any reason for this, unless, as sometimes happens to us now, its builder was hampered by the position of some grave in the churchyard of the older church. The length of the chancel is only one-fourth of the whole length of the church inside. It is, indeed, unusually small and insignificant: I suppose the Trejagos and Trenoweths built their transepts, and felt comparatively little interest in the principal altar; and they endeavoured, no doubt, to keep up as much as possible of the old walls, with the usual unsatisfactory result. I have been obliged entirely to rebuild the steeple: it was in a ruinous condition, and, though heavily buttressed on all sides, so badly built as to be unsafe. Moreover, there was no proper space in it for the bells; the belfry was very low and mean, and its whole upper stage seemed to have been altered and modernized. I am informed by Mr. Webber, the present rector of St. Michael Penkevel—representative of the old Arch-presbyter—that there is some record of the tower having been lowered by Admiral Boscawen (who died in 1761), in order that it might not present a land-mark to the enemy, and in 1767, it appears from the parish books that a small sum was spent on the lead and other portions of the roof. The belfry window on the north side looked like the lower part of an old window, but the others were very poor and modern looking. The new steeple, therefore, follows the old work up to the level of the bottom of the belfry, and I have added a belfry stage, with lofty roofs to the tower and its staircase turret. The buttresses are rebuilt pretty much in their old form. They are certainly larger than is necessary, but they gave much of its massive solid character to the old work, and, I think, they have given the same effect to the new. In these days massiveness and solidity are too seldom attempted; we strive too much to attain the greatest effect at the least expenditure, and the result is, that we fail to give that sense of grandeur which the simpler, but solider, old work seldom failed to give. The lower stage of the tower is lighted by a two-light window on either side, and entered by a doorway with chamfered and moulded jambs, carefully stopped near the ground; over this doorway was a window, which I have restored. The tracery in these windows was all destroyed. The tower arch is a pointed segmental arch, springing from corbels supported by two full length figures. These were completely concealed by a western gallery, and are so damaged that it will be necessary to insert new figures. The staircase turret is at the south-east angle of the tower. The first door which opened out of it led into a room over the porch. This room was destroyed, though, in addition to the existence of the door, the porch walls remained so high from the ground as to prove that the chamber must have been erected. The probability is, that it was a sacristy rather than a parvise. There is no other place for one, and with four altars to serve, it would have been difficult to dispense with it. It was not a residence for a priest, as has been suggested, because, as we have seen, the arch-priest and the three chaplains lived together in a collegiate house.* I have, in rebuilding the porch, rebuilt this room above it, and it is again to serve as the priest's vestry. The entrance to it is by a door with a square trefoiled head. A few steps more of the newel staircase lead to the chapel in the tower, where, under a recessed segmental arch in the eastern wall, stood the altar, built up of solid masonry, and with a piscina by its side. Over the altar is a small vesica-piscis shaped window, enclosed outside within a square panel formed by the label moulding. There was, perhaps, a certain amount of unreality in the extreme conservatism of the course which I have adopted here, but the arrangement was too curious and too unique to be destroyed, and I have, therefore, had all the stones carefully replaced exactly in their old places in the new tower, and the arch, altar, piscina, and window, are, I trust, now likely to last longer than they have yet done. Above this there is little to describe. The belfry windows are large, with bold oak luffers, and there is ample room for the peal of six or eight bells which the noble founder proposes to provide.† The steeple is covered with lead, and from the parapet of the tower over the house at Tregothnan—built by Wilkins—may be seen, on one side the distant sea, then the well-stocked deer park, sloping down to the wooded banks of the Truro river—one of the loveliest of which the South Coast can boast—and on the other side, one of those characteristic views which all who know Cornwall will recollect—bare rounded hills, treeless and

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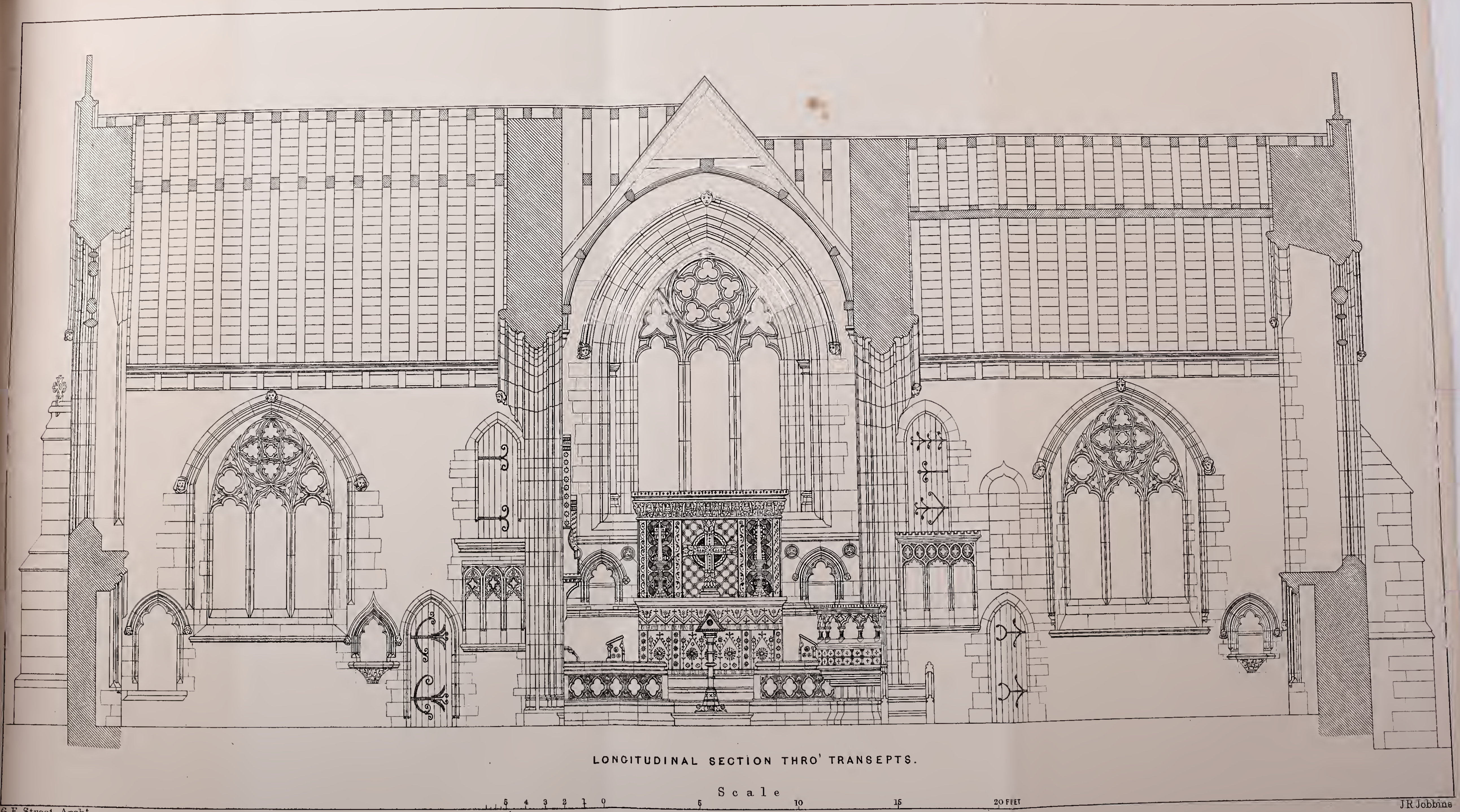
* Hals describes "the convent house in the churchyard for the chanter's residence" as still standing in his time. Par: Hist: of Cornwall, III. 208.

† "This church being a quarter cathedral to the Bishop of Exeter, the old bells in this tower of St. Michael Penkevel were baptized as appear from their names subscribed in them, St. Michael and St. Mary." Hals, in Davies Gilbert's Par: Hist: of Cornwall, III. 210.


LONGITUDINAL SECTION THRO' TRANSEPTS.
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5 4 3 2 1 0 5 10 15 20 FEET

G.E. Street, Archt.

J.R. Jobbins

Church of S. Michael Penkevel, Cornwall.

forlorn, stretching away far as the eye can see, with here a mining chimney, and there an old lichen covered and pinnacled tower breaking the monotony of the horizon. The nave proper is short, and had north and south doorways, one window of two-lights on each side, and then the arches opening into the transepts. The south door has well moulded jambs, and opens into the south porch, of which I have already spoken. The north door is simpler, and, before the restoration, opened into a modern vestry, erected against the north wall of the nave. The windows were both destroyed, and that on the north blocked up. Here, therefore, I cut into the wall, and found the jambs and sills and inside arch, but no remains of the tracery. I have been obliged, therefore, to insert new tracery, only retaining the old outline and jambs, and inside arch. The transept arches differed: that on the south was a circular segmental arch of two chamfered orders; this looked early, but it was partly made up of older work, and was altogether in so ruinous and decayed a state that I have thought it safer, on the whole, to repeat exactly the arch on the opposite side, opening into the north transept. This is richly moulded, and is a pointed segmental arch, with a label on the side towards the transept only. The two transepts are certainly the most interesting portion of the whole church. They are curiously similar in all their arrangements, and these are of a very unusual kind. The south transept had a three-light window in the south gable, of which the tracery was destroyed, and another in the east wall, which had retained its old rich tracery nearly intact. Below the south window is an arched recess for a monument, and to the east of this, two sedilia with cinque-foiled heads under segmental arches. The altar stood, no doubt, under the east window, and to its right hand side in the east wall is a very richly moulded piscina. To the left of the window is a most complex arrangement of doors and niches. There is the old door into the Rood staircase turret, and above, to the left, the doorway which opened from the staircase on to the rood-loft. Above the lower door is an arch recessed about six inches in the wall, which at first looked like a doorway, but which was in fact, I suppose, a niche for a figure. Under the upper doorway I found a square headed recess, which was entirely stripped of its old enrichments. However, among the fragments which I found in various parts of the modern filling-in of the windows and niches, were various fragments of very small delicately moulded tracery. After long exercise of my ingenuity, I managed to piece together enough of this work to prove, beyond doubt, that it came from this recess, and my drawing shews it restored. What this triple niche—as it turns out to have been—contained it is impossible to say; probably three sculptured figures, though the fashion for introducing paintings at this period, of which we have documentary evidence in the works of Bishop Stapledon, at Exeter, makes it possible that these shallow recesses were rather for paintings than for sculpture. The north transept has all the same arrangements as the south. Here, however, the founder's tomb, and two sedilia in the north wall, were not enough, and a third seat is obtained in the eastern wall, on the left hand of the altar, which, it is just possible, may have been provided for the arch-priest. Sedilia in a north wall are extraordinarily rare, if not unique, and in the eastern wall, I fancy, quite so. To the right of the altar was another piscina, very richly moulded, a door leading to a second rood-staircase turret, with a second door above, opening on to the loft, and a recess corresponding with that already described in the south transept—through which (at a later date, I think) a hagioscope had been made into the chancel. This recess had tracery of the same kind as the other, but different in its pattern, and which I have also been able to reconstruct from the fragments.

There are one or two points about the tracery in the recess of the south transept, which are quite worth mention, inasmuch as they distinguish the work of old masons from anything ever done at the present day. The way in which the mouldings are worked is very peculiar. With the same general section, and the same thickness from back to front, they, nevertheless, vary in almost every part of the work; and this variation is designed beyond a doubt. It seems that the mason must, first of all, have designed the leading lines of his tracery, which he struck out with his compasses; he then designed the openings, and wherever the strict carrying out of the moulding would leave little or no piercing in the spandrels of the tracery, he sacrificed the symmetry of his moulding, and, to use a modern phrase "cooked" it. We all know that the earliest designers of tracery looked only to the shape of the piercings in the slab of stone; that after them came men who strove to unite good leading lines and good piercings, and after them, again, others who sacrificed the piercings altogether, and troubling themselves only about the lines of their traceries, in the end completely destroyed all their nobility. Now, here we have a man at work, just at the very moment of transition from one style to the other. As a young man he may have wrought at severe geometrical traceries, and he was, probably, taught to think only of the fine and perfect form of the openings. He lived long enough to find lines all the fashion, and gave way to the fashion, but, in the end, his early education prevailed, and he did his best to make his piercings therefore regular and good and let the mouldings take care of themselves. This tracery is all in small fragments, and you will agree with me that if I find a mason who can, or who will if he can, copy it, I shall be very lucky. Indeed, in looking at work of this kind, it is impossible not to feel the force of Mr. Wyatt Papworth's claims for the "master mason," as the real author, of much, at any rate, of the details of these old works; for none but the man who wrought the work with his own hands would have been likely to devise so ingenious a way of improving its effect. It is, certainly, not the sort of thing that anyone, now-a-days, making a design by means of an assistant, would ever think of doing. The tracery in the recess in the north transept is not very admirable, being very confused and eccentric. My drawings are, to a small extent, conjectural, as will be seen by the tint on them. The coloured portions are those of which I found fragments. I have also put together another piece of open tracery, with a battlemented cornice, from the same collection of fragments, but I cannot say from whence it was removed: it seems to fit none of the openings in the walls, and may, perhaps, have formed part of an arcade over one of the altars. The gables of both transepts are similar, in having above their windows small openings full of most minute tracery. These were completely concealed by plaster, as also were most of the niches, piscinæ, etc., which I have described in the transepts. The buttresses of the south transept are plain, those of the north transept are finished with gables, arranged with sockets for finials; and, among other fragments, I found half of a small cross, which, there is no doubt, came from this place. The rood-staircase turrets had been completely destroyed, but when we discovered their doors, we found heaped together in the hole in the wall behind them, the broken fragments which have already been mentioned. The chancel, as I have already said, is of earlier date than the rest of the church, and is lighted with two-light windows, with simple and effective cusped heads. The east end was all modernized, but there were traces of two niches, one on each side of the altar, also of what seemed to be the jambs of a door in the south wall. The east window was, I think, a recent work, and contained some stained-glass, in memory of one of Lord Falmouth's family, which, I think, is executed by Mr. Willement, though it is not equal to some of his work. Beyond the chancel is an enormous burial house, built by one of the Lords Falmouth. There are very few coffins in it, so that, I hope I shall be able to reduce its size considerably.

There are several features in the architectural detail to which I ought to call your attention. Almost all the arches have had labels with carved heads introduced, not only as terminations, but also as key-stones. This, I need not say, is a most rare arrangement, and certainly a disagreeable one. Under the window sills inside were generally short stringcourses, the length of the window, which have been everywhere cut away by the plasterers, as also have been all the labels throughout. Everywhere, however, their outline remains, and among the fragments are many which give all the needful authority for their restoration. The cusping is generally very slightly ogee in its character, and one of the windows of which I discovered the fragments walled up in the west wall of the north transept, has a later look than the ascertained date of the building; it is really, however, very similar to the tracery opening in the gable of the south transept, which is beyond any doubt part of Sir John Trejago's work. The roof had, as I said at starting, been modernized and then ceiled; it contained, however, a good deal of the old carved oak work so frequently met with in the cradle roofs of Devon and Cornwall. We hope to be able to preserve this work in a part of the new roofs. One curious feature is the great carved beam which occurs over the transept arch, cut to a considerable curve, in order to clear the arch. None of the roof appeared to be of the same age as the church.

It would be wearisome and unprofitable to dilate at greater length on the architectural character of this little church: but there are other points to which the description I have already given naturally leads, and on which I must say a few words.

There is, for instance, the natural curiosity as to the architect of such a fabric, about which, I fear, I can say nothing. At the same time great works were going on at Exeter Cathedral, and though there is, of course, the general similarity of all such works, there is none of that special similarity by which it is almost always possible to detect the work of the same artist in different buildings. If, however, there is no connection with the work in the cathedral, there is a very considerable similarity to other works of the same age in the same county. I have already, some ten or twelve years ago, touched upon this subject in a paper which I read before the Exeter Architectural Society, and of which I gave a copy to our library. The illustrations of that paper will enable you to see pretty clearly the points of similarity which are to be generally noticed in the fourteenth century churches of Cornwall.

First of all I need not say here, that the ground plan is that part of a design in which we almost always find the greatest amount of individual, provincial, or national character. Every one knows the general type of the great churches in this country in the eleventh and twelfth centuries, and the complete revolution which it underwent in the following age. In France we know the ground plans of Anjou and Poitou, of Perigord, of Auvergne, and of the Ile de France. In Italy, in Germany, and in Spain, everywhere in short, we find a prevailing type of plan; each country presenting some peculiarity. Well, in Cornwall, I believe, the common ground plan, in the thirteenth century, to have been the simple nave and chancel which we had here at Penkevel in the early church: and however this may be, it is at any rate certain, that in the fourteenth century we have there a considerable number of cruciform churches, and, indeed, that almost all the churches of this age still remaining are simple cruciform churches without aisles, without chancel arches, and with western steeples. I may mention in illustration of this the plans of Tywardreath, Lanreath, St. Winnow, Talland, Pelynt, St. Ive, St. Cuthbert's, Sheviocke, and St. Mellion, all of them originally of the same age and same character as that of St. Michael Penkevel in their original state, and these are some only among many. At a later date this cruciform plan was seldom, if ever, adopted, and instead of it we have almost always a plan consisting of nave and aisles all of the same length, and with chancel and chancel aisles, divided only by the gorgeous wooden screens which were once so common in Cornwall. The detail follows the plans, and though there are variations of some kind, it is remarkable how in the case of window tracery the same leading lines are introduced into most of the Cornish windows of this age. A small sheet of sketches of tracery, which I exhibit, will explain this. In most of these examples you will see that the windows are of three lights, with the monials continued on till they intersect the outer arch, and with the same curve. The spaces thus left are filled in with foliation of very similar character, and generally slightly ogee in some of its outlines. The rear arches at St. Michael Penkevel are generally moulded, and the arch in the wall between the tracery and the rear arch filled in with stones, sloping from one arch to the other in an awkward fashion. The quoins and arches of the thirteenth century chancel windows and buttresses, and of the remains of a window discovered in the north wall of the nave, were all of Killas, and not of wrought stone, and this

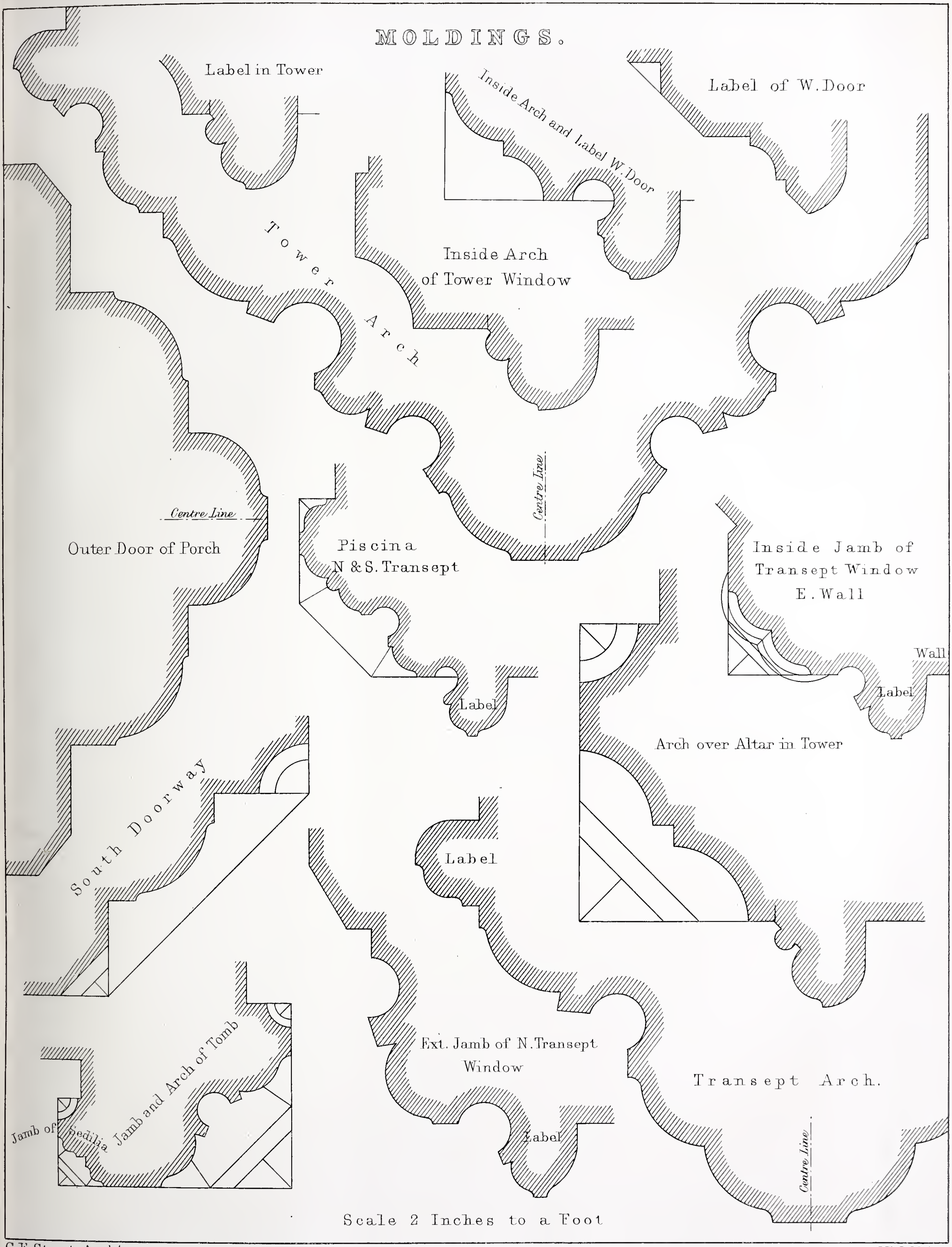
I have observed in other Cornish works of the same age. The carved heads introduced as key-stones in this church do not, so far as I know, occur any where else in the county. The traceries naturally recall those of Exeter Cathedral: but I have seen none in Cornwall sufficiently like them to lead me to think that they were designed by the same hand; the Exeter traceries have their peculiarities, and these are not repeated in Cornwall; among them is the custom of stopping the labels on small corbels level with the capitals instead of on carved blocks above them, and the filling in of the subordinate cusping in the eastern windows is in the choir decidedly earlier and better than these, and in the western windows decidedly later in character.

Several of the fourteenth century churches have sedilia, of which I think there are no examples in the earlier and later churches. Here the arches of these are pointed segmental, and I ought to observe that the architect evidently had a great fancy for this form. The tower arch, the transept arch, the arch over the altar in the tower, the rear arches of the windows, the piscinæ, and the sediliaarches, are all of the same shape, whilst the founders' tombs in the two transepts have segmental arches struck from one centre.

The mouldings in Cornish churches of this age generally consist of repetitions of the wave-mould. Here, however, the main arches, and those of the sedilia, piscinæ, and recessed tombs are very richly moulded, and most of the labels have the common fourteenth century feature of a hollow connecting them with the arches to which they belong. I exhibit a sheet of mouldings which will best explain their character. Probably no church in the county has such rich and full mouldings as this, and fortunately most of them are well preserved: the mouldings are, in all cases, stopped with considerable care. The arches are continuous in every case save the tower arch, which as I have said has corbels. There is one other feature of similarity in this class of church which I must not forget; the piscinæ are often in the east instead of the south walls; here, as we have seen, there are three such, besides one of the sedilia. There are, too, several examples of founders' tombs in the end walls of the transepts. The towers are generally at the west end, and the earlier examples have very simple pointed arches; I know, however, no tower of the same character as this of St. Michael Penkevel. The beautiful steeple at Lostwithiel—so unique both in its design and its mode of construction—presents some similarity to it in its traceries, but none in any other part, and the steeple of St. Neots which, after this, is the best example of the period, is certainly more like it, but not enough so to warrant us in attributing them to the same architect.

In the materials made use of there was even more identity; for it is very remarkable that, whereas the later churches in Cornwall, with few exceptions, are built of granite, or of the decomposed granite commonly called moor-stone, almost all the early churches were built with quoins and dressings either of sand-stone, which occurs in small quantities in some parts of the county, or of Elvan obtained from the quarry at Pentuan, or from several similar Elvan dykes which traverse the granite and slate rocks of Cornwall in a direction from the north of east to the south of west. The quarry at Pentuan belongs to Lord Falmouth, and has now for some time been worked exclusively for this church; the stone is quarried on the face of the cliff, and thrown down on to the beach, from whence it is brought away by boats whenever the weather will admit. The quarryman always assures me that when he has broken his neck no one else will ever venture to quarry the Pentuan stone; and as he quarried it for the first church I ever built—at Biscovey, in the same county—I can only tell him that I hope at least he will defer his catastrophe until after I have built my last. Portland stone seems to have been used to a considerable extent in the more delicate portions of the fourteenth century work at St. Michael Penkevel, but it has decayed everywhere; and whereas much of the old Pentuan stone is fit for re-use, scarcely a fragment of the Portland admits of it. The body of the walls is built of Killas, an argillaceous slaty stone, which cleaves into thin flat stones, and makes a very good wall; this was commonly used in church work before the fifteenth century, and not so much afterwards.

Pl. 4.



G.E. Street, Archt.

J.R. Jobbins.

Church of S. Michael Penkevel, Cornwall.

The monuments contained in the church were not remarkable. There were two flat stones with crosses on them in the porch, which I hope to re-lay in the transepts. These were of the thirteenth century. Hals mentions two brasses which I cannot recollect to have seen; one of a priest with the inscription, "Pray for the soule of Maister John Trembras, Maister of Arts, & late parson of this church, whych decessyd the 13 day of September, in the yeare of our Lord God 1515, on whose soule Jhu have mercy;" and in the south aisle (transept) another in armour in memory of John Trenowth, Esq. 1497. The modern monuments were numerous, and blocked up the most interesting parts of the church. Lord Falmouth has had them moved to the side walls at the west end of the church, where they do comparatively little harm. Among them is a monument to Admiral Boscawen who, as his epitaph says, "did of a fever at Hatchlands Park, Surrey, a seat he had just finished (at the expense of the enemies of his country) and amidst the groans and tears of his beloved Cornishmen." Another to his wife is quite worth giving on account of its ludicrous quotation from Boswell's Life of Johnson. "Here lie the remains of the Hon. Frances Boscawen, daughter of William Evelyn Glanville, Esq. &c. &c. Her long and well spent life in the observance of the purest and most exemplary piety, and in the practice of every christian virtue, was terminated on the 26th day of February, 1805, in the 86th year of her age. She was endowed with an uncommon and remarkable strength of understanding, and in society she is thus most truly described by a contemporary author.* 'Her manners are the most agreeable, and her conversation the best, of any lady with whom I ever had the happiness to be acquainted.'" This lady, by the way, figures prominently in Mrs. Delany's recently published correspondence.

The account of the restoration of an old church would not be complete without some observations on the uses to which the building is to be applied, and the proposed mode of its adaptation for them. This is the more necessary because, in the first place, I cannot find that the subject has been ever yet properly brought before this Institute; and in the second, because Mr. Scott, when he gave us, at the beginning of the year, his paper on the restoration of antient buildings, had not time to go into the whole subject, and was obliged to confine himself solely to the question of their conservation as monuments of art. We must never forget, however, that they are, in truth, still more important, and still more dear to age after age of christian men as temples of religion and sanctuaries of all the most sacred mysteries of their faith.

It is impossible, therefore, to go wholly and thoroughly into the question of Church Restoration, without saying something as to the mode of fitting the restored building for the functions it has to perform: and I think that, as very many of us are now more or less engaged in the same work, it cannot be a waste of time if I point out here, as distinctly as possible, what this means, and what the Church of England requires at our hands for her service. I can only speak for Church of England men: in this country all the churches are her property, and it is her duty, as it ought to be her pride, to sustain them, and to use them properly and consistently with her rules and antient traditions. It is true that these have been oftentimes forgotten, or intentionally overlooked, but yet, providentially, they have never been abrogated; and the revival of attention to ritual proprieties was the precursor as it has been the moving cause of that zeal for church restoration, which has distinguished the last quarter of a century in this country perhaps beyond any similar period elsewhere since the Reformation. Prejudices, it is true, have sometimes been excited on the subject; but this was in the earlier days of the architectural revival, and it is not at all too much to say, that at the present moment almost all parties in the church are well disposed and prepared to accept those church arrangements which conform most to the letter and spirit of the Prayer Book; and that, in truth, it rests with us architects to make our restored churches fit for their purpose in the best sense of the word. It is in some degree, no doubt, a reproach to us, as a body, that in so many cases the arrangements proposed by the architect manifest a complete ignorance of the right use of the building; and I cannot understand why any one of us who undertakes such a work is not bound to study this part of his subject just as carefully as the architect of a house, a shop, or a theatre studies the special requirements of each of them before he pretends to make his plan. In the one case, as in the other, the business of the architect is to give advice, not merely to receive instructions; and it seems to me that when the welfare of souls depends, in no small degree, on the nature of his advice, it is all the more necessary that he should give it in the very best and most careful way. It is, indeed, I know, maintained by some that, in arranging the plan of a church, the architect's duty is solely to do what his client demands; but even if this be so, in what way is the architect to act, who is asked by his client (as I often am) simply to arrange his church in full accordance with the rules of the church? or how is he to act if he receives no instructions at all? In either case he must act for himself, and ought therefore, first of all to have made up his mind clearly as to what will be required, and what his course will be. My own view is, that in any case he ought to propose what seems best to his own judgment, and leave with his client the responsibility of its rejection; and cases may, I think, often arise in which a high-principled artist must refuse to be a party to schemes, which are not only not his own, but which are also destructive to ecclesiastical or architectural propriety. Such, for instance, is the defacing of an already consecrated church by the erection of galleries—those cheapest and most miserable of expedients for eking out the contemptibly small provision we make for the teeming thousands of our labouring population; or such, again, is the erection of a grand pew for an individual in the midst and to the damage of the other seats of his fellow-parishioners. I cannot but think, however, that we shall most of us agree in the feeling that in proportion as we permit ourselves or are allowed to go fully into these somewhat minor architectural questions, so exactly does our interest and zeal in our work increase; and it is fortunate for us that the more we examine the matter the more opportunity do we find afforded for the play of our fancy in the detail of fittings, ornaments and enrichments by the strictly interpreted rule of the Church of England. In new works the shell of the building is the great work to be done; but in church restorations usually the work admits of little which one can call one's own; old authority has to be followed, old stones to be reverently repaired and preserved, and after this the greatest scope for the genius of the architect is in the design of those minor accessories, which, mainly from ignorance of their lawfulness, are so often forgotten and omitted in our plans. And it is no little encouragement to us to find what is undoubtedly the case, that the most correctly arranged churches are also almost invariably those in which the greatest architectural skill of the day has been displayed. Nothing so much increases artistic power as the possession of zeal for, and interest in, the work in hand; and, as I now proceed to shew, we have ample subject for both in the re-arrangement an old church.

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* "Boswell's Life of Johnson" (*sic.* on monument.)

I shall begin at the church gate, and go from thence to the altar, shortly stating what seems to be required at all points. And, first, this very gate should be cared for. Here the corpse is to be met; and it should be amply wide therefore, and may well be covered with a canopy. In Cornwall the old lych gates often remain; they are double, with a low wall between them on which the coffin is rested. To the right of the path from this gate to the porch is frequently to be found the base, or some portion of the old churchyard cross. This should be searched for, and, if possible, restored; it is a beautiful object, sanctifies the soil, and in this age of costly memorials it might often be introduced without difficulty. The porch should have low wicket gates to keep out animals, and these should be simply latched, so that the church may be accessible to all for their private devotions. If there have been seats in the side walls they should be restored : nothing is nicer than the gathering of old church goers in their porch before the service begins. The inner door, should, if it hangs single, always hang to the western jamb, so that the altar may at once be seen on entering; but it is often very convenient to hang the doors of the main doorway folding, so that when open they may not project beyond the thickness of the wall.

The first object inside the church is the font; the 81st canon requires it to be in the "antient usual place," and common usage agrees with this. But what we have to take care to provide is, that the font so placed should be fairly well seen, so as to allow of the public baptism of infants; it must have a drain and well under it, and there must be so much space left around it as will allow parents and sponsors to kneel on the north, south and west sides, with a step for the priest on the west side. Old fonts are usually so placed as to prevent any one kneeling on the east side, when their backs would be turned to the altar. If a new font has to be provided, its bowl should be large enough for immersion. Generally speaking, however, the old font is to be spared and preserved, however rough it may be : often when it is lost and disused it may be recovered; and, if it is not again possible to use it, it had better be buried below the new font, so as to avoid its desecration. In any case the font cover should be restored.

Here we must ordinarily see that the provision for bell-ringing is good; and we need never be afraid to suggest the ringing of the bells from the floor of the church where it is convenient to do so. The ringers are the more likely to remember where they are. The bier required for funerals when it exists may best be kept at the west end of the church, and when it does not, its restoration should be suggested. It should have a herse and herse cloth or pall, and if space is valuable, I have seen it supported on iron brackets against the wall with good effect.

In arranging the seats there are several matters to be borne in mind: *e. g.* There must be a passage from east to west; there must be ample space about the door for funerals, and for the performance of the first part of the marriage service :* the central passage must be of good width, not less, if possible, than five feet, and there must be ample space left between the seats and the chancel arch for (*a*) the Litany desk; (*b*) for the churching of women, ordered by the Prayer Book (1549) "to kneel in some convenient place nigh unto the quire," and (1662) "as hath been accustomed or as the ordinary shall direct;" (*c*) for catechizing;† and (*d*) for the pulpit. As to galleries, when they exist they should be removed, and every architect should resist strenuously their re-erection. Archbishop Laud's opinion is one in which we shall all agree. "The truth is," he says, "I did never like galleries in any church: they utterly deface the grave beauty and decency of those sacred places, and make them look more like a theatre than a church. Nor, in my judgement, do they make any great accommodation for the auditory; for in most places they hinder as much room beneath as they make above; rendering all, or most of all, those places useless by the noise and trampling of them which stand above in the galleries." ‡

As to the seats, what is required is, first of all, that they should encourage rather than hinder kneeling, and be comfortable for sitting in. Three feet from back to front is necessary for this, a wide seat board, a back which slopes very little, and, if possible, no panelling below the seat. The seats should be open on three grounds; the first, but least important, because they then look best; secondly, because they can then best be warmed and ventilated; and lastly, because the abolition of doors is the first step towards the abolition of the pew-system, than which there is no greater impediment to the whole use and object of a church. They should also, if possible, be moveable on a tiled floor, and the seat ends may easily be so designed as to make it impossible to hang a door to them. Architects may do much to procure the right use of churches; and may well always recommend the revival of that good old custom, not by any means extinct yet in any part of England, but, sad to say, least seen where churches have been most restored, the division of men and women in church. Our friend Mr. Ashpitel, it is true, in his paper on chancels,[*] doubts the antiquity of the custom: I can now only refer those who are inclined to agree with him, to what Bingham says,[†] and to the fact I have mentioned already,[‡] of the common prevalence of the custom in this country. In the arrangement of seats it is well, of course, if possible, to follow the old plan when it can be discovered; it is rarely, however, that this can be done, and where more seats have to be provided they should, as much as possible, all face one way (to the east), and this even in small cross churches, like that of St. Michael Penkevel, where this arrangement leaves the old piscinæ, sedilia, &c. unobscured. The only furniture required outside the chancel is the Litany desk and the pulpit. Unfortunately the former is rarely used, yet one can hardly say why; the Litany is enjoined by the Royal injunctions,[§] still in force, to be said or sung in the midst of the church at a low desk commonly (but erroneously) called the fald-stool. At the coronations of our sovereigns the Litany is ordered "to be read by two bishops, kneeling at a fald-stool." In the plan of Bishop Andrewes' chapel the "fald-story, whereat they read the Litany," is marked; and in the commination service "the place where they are accustomed to say the Litany" is mentioned; whilst the frontispiece of Sparrow's Rationale of the book of Common Prayer shews it in use in the right place. Of the pulpit it is only necessary to say that it should not be very high, and that it ought, as little as possible, to conceal the altar or the chancel from the people. Its approach should be easy from the chancel, as it is necessary that it should be entered by the clergy coming from the altar or the stalls. Above the chancel arch the commandments are to be painted. They are required to be at the east end of the church, *not* of the chancel; the two terms are always carefully used.

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* "The persons to be married shall come into the body of the church."—RUBRIC, 1662.

† Required by the Rubric to be done every Sunday at evensong in all parishes.

‡ Archbp. Laud's troubles, &c. p. 96, quoted in Hierurgia Anglicana.

I now reach the part of the building as to which the greatest confusion exists in practice, whilst, nevertheless, the law is singularly plain, distinct and concise. The direction in the Prayer Book is still our only and sufficient guide, and it is in the well known words, "*The chancels shall remain as they have done in times past*," which is followed by the direction that "such ornaments of the church shall be retained," "as were in the second year of the reign of King Edward the Sixth." The chancels "in times past" were divided from the nave by a screen, fitted with desks and seats, or stalls for a choir, raised by steps towards the east, fitted with other seats for the clergy near the altar, and with niches in their walls, which served as piscinæ and credences. The only question for us, therefore, is, whether the use of these arrangements was ever formally, or, indeed, in any way abrogated before the second year of King Edward; and about this there can be no doubt. The Rood screen is undoubtedly legal; Bishop Cosin's gloss[‖] on the words "in times past" is, "that is, distinguished from the body of the church by a frame of open work." Bishop Beveridge,[¶] in his well known sermon at the Consecration of St. Peter's, Cornhill, defended the erection of one there by Sir Christopher Wren. The judicious Hooker defends them.[**] There was one in St. Giles' in the Fields Church;[††] and they are not only to be seen in many of the City churches, but in a number, also, of churches throughout the country of post Reformation date. Bishop Montague* required them in 1638, and pointed out, among their uses, the keeping dogs out of the chancel. Any one who has heard the dogs barking about Spanish churches will see the value of the protection where it is customary to take dogs into church; and our friend Mr. Scott, I remember, in one of his books, advocated altar rails on the same ground, though I am bound to say, that where I have seen his altar rails, the dogs must be very well behaved, and moral dogs, if they are deterred by them from going through or over them! Queen Elizabeth's injunctions on the subject were, that the *lofts* only should be removed, "a convenient crest" to be put "on the beam" in place of them, and "the seats in the quire to be left as heretofore hath been used." Unfortunately clergy and architects have combined to run a muck at our old screens, and in a few years, if things go on as they have done, we shall have none left. Our Committee on Restoration should take up this point, and see what steps can be taken to save from further destruction these which are amongst the most interesting and beautiful fittings of our churches, and in some respects almost peculiar to our country. Where no screen exists it may be better to erect a low one with gates; this answers the purpose of the high screen, may be made to look very well, and does not disturb old prejudices.

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[*] Archæologia, vol. xxxvii, p. 130.

[†] Bingham. Book viii, chapter v, sect. 6.

[‡] See also the direction in first Prayer Book of Edward VI (1549) at time of communion, "the men on the one side, and the women on the other side."

[§] "The Priests, *with other of the quire*, shall kneel in the midst of the church and sing or say distinctly the Litany." Queen Elizabeth's Injunctions.

[‖] Bishop Cosin's Notes in Nicholls' Commentary, p. 15.

[¶] Collected works, p. 24.

[**] Ecclesiastical Polity, v. 14.

[††] Given by the Duchess of Dudley, temp. Charles I.

Of the chancel seats I need say but little. They should, if possible, be restored; or at any rate be arranged on the usual old plan, with the addition of a second seat and desk, below the others, on each side for the boys, of whom the bulk of our choirs are composed, the clergy and men sitting in the back seats or stalls. It is rare to find these subsellæ in old parish quires. In nineteen churches out of twenty the best place in every way for the clergy is the western seat in the chancel on either side. Yet, perhaps, in nineteen churches out of twenty a useless reading desk is erected, at considerable expense, in the nave. For this, as a rule, architects, and architects only, are responsible. They either do not know, or do not care about the matter. Yet a "reading pew" is but once mentioned in the Prayer Book,† and then as a convertible term with pulpit,‡ and writers like Hooker, Wheatley, and others speak of it as a desk facing *east*, not *west*, when it *was* used. The advantages of the use of the chancel seats for the purpose are, that the clergy are then able to take their part properly with the choir, that when there is more than one priest the service may be divided between them, to the great gain of their throats, and finally, that it looks better, and is more in accordance with the Prayer Book than any other use. The stalls should not exceed one-third of the length of the chancel. It does of course sometimes occur that the plan of the church seems to prevent the proper use of the chancel by the clergy and choir. Some years ago, in restoring the fine old church at Wantage, I had what appeared to be such a case. Accordingly, though the old stalls remained in the chancel, I was induced to put some light desks and seats under the central tower for the clergy and choir. Here they sang for some two or three years, and then again trying the old arrangement, found that after all the quire was the best place for the service. The same thing has happened in the very similar church at Lambourne, and in both the piers of the central tower are very heavy, and the tower arches low and narrow. Our forefathers got over the difficulty by having the stalls in the quire, and the rood loft on the west side of the tower, so that the parts of the service like the epistle and gospel and the sermon, which people most required to hear every word of, were read in the midst of them. Between the stalls may be a lettern for the Bible: this is better double than single, and its design will admit of much fancy and ingenuity.§ Here, too, if possible, should be the organ, as near as possible to the choir, and with the keys so placed that the organist may be able to communicate with and direct the choristers. East of the stalls there should be ample space between them and the altar rail or step for communicants, and again as much space as possible between the altar rail and the altar. The sedilia are still the best kind of seat for their place, and take up less room than chairs. One chair for the bishop against the north wall seems indeed to be required when he is present. The piscina or drain may well be restored, to wash the chalice and paten at (though this may be done—but not so well—in a vestry piscina,) and one of the niches so often found in the walls may be made use of for a credence, or table of Prothesis.[*] As to the altar, it is seldom that any thing is found to be restored, save the old altar stones, which in all cases should be taken care of and re-used, or at any rate no longer be allowed to lie where they can be trodden over in the floor. As far as possible new altars should be as large in all respects as the old: they then look dignified. If the altar is raised on a foot-pace it should be amply wide in front, projecting about two feet six inches west of the altar. The altar must be covered with a cloth: this may be embroidered in the ancient fashion, or may be of the most costly material. The Queen at her Coronation—the most solemn moment of her life—offered on the altar at Westminster Abbey a pall for the altar of cloth of gold.[†] Old illuminations, and the remains still left, enable us to restore this part of the church and its furniture without difficulty.

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* Bishop Montague's Vistitation Articles, p. 42.

† In the Commination Service.

‡ See on this point the remarks of the Editors of "Hierurgia Anglicana," p. 42.

§ "He that readeth so standing and *turning himself* as he may best be heard of all such as are present."—Rubric, 1662 and 1554.

An old vestry is comparatively rare, and care should be taken to fit it up properly, Presses are required for the surplices, and for the altar cloths and linen, and a safe for the altar vessels. An external door, moreover, is a great convenience.

Finally, from beginning to end of his work, the true church architect's thought must be not how he may make the prettiest work, but how, first of all, he can make the most religiously impressive work fit in all respects for its purpose, and secondly, how he can best, consistently with the other condition, make his work a thorough development and exhibition of the old work. To this end the great fact that the Church of England is that most conservative body in Christendom, who puts on the forefront of all her services that "the chancels shall remain as in times past," is the greatest aid and assistance; for if architects are allowed to work in simple obedience to this rule they have no difficulties to contend with, which may not most easily be surmounted. It is true that this can only be done by thorough devotion to the work on the part of the architect; for no building which requires much skill for its complete rehabilitation, can be taken in hand with justice by any architect whose time is not free enough, or whose enthusiasm is not warm enough to lead him personally to manage the whole work.

So far, I have spoken only of the course to be pursued in the restoration of an old English church; and I will say a few words only by way of directing attention to the equally important question of our post-reformation churches. No doubt in arranging them for our service there is no example at once so apt and so venerable as that afforded by San Clemente at Rome. In Mr. Asphitel's words, "there is a choir formed here by an enclosure or wall of marble about four feet high, carved with crosses and emblems, and enclosing two ambones or pulpits, one for reading the gospels and preaching, the other for reading the epistles." "In this enclosure the chorus sat, and sang the psalms, hymns, and doxologies." St. Pancras, and other churches of its class, so arranged might really remind the worshippers a little of their purpose; their altars would not of necessity be against the east wall:[‡] in an apse the right place is under the chord of the apse, and in such a position they might well be placed under baldachins, as Sir Christopher Wren, I think, proposed at St. Paul's. Nothing, indeed, astonishes me more than the indolence which has hitherto been shown in regard to the proper restoration and re-arrangement of our classic and Italianizing post-reformation churches. The world seems to have identified the sumptuous restoration of churches with gothic architecture, and though it is undoubtedly true that it more admits of gorgeous beauty, and is in all respects more interesting, symbolical, and truthful than any other style, yet I can well imagine one of our later churches, stripped of its pews and galleries, richly decorated, and properly fitted for our worship, being in the end a very noble temple for our common prayers. There are other points which should never be neglected in restoring an old church. Such, for instance, are the warming, ventilating, and lighting of the building. Nothing is more unwise than to allow any one any pretence for saying that a restored church is less comfortable than an unrestored one; but this needs no enforcing here, when all of us suffer the common penalties of bad arrangements in some of these particulars every time that we meet.

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[*] In the absence of an old niche a new one ought of course to be provided.

[†] The Coronation Service.– Maskell's Mon. Rit. Ecc. Ang. III. 88.

[‡] The altars at Arundel, Stone, and Warfield are examples, amongst others, of the fact that the altar did not always stand against the east wall in a square-ended chancel.

Here I must conclude: I feel that I owe you some apology for having detained you at all upon a part of the subject, which at first sight might not appear to be one which you would be called on to consider to-night. I found, however, that my subject naturally led up to this question of church arrangement, and could not well be treated without reference to it. I have endeavoured to confine my propositions to points which appear to be clearly ruled and decided for us. This, it may be said, is a work of supererogation; and so it is, I am aware to very many of you, who do not require to be informed at all by me on the subject; but on the other hand, there are others to whom I have no doubt whatever the ventilation of the question, and the direction thus given to one very necessary line of study, will not be without benefit. For some years now I have had to examine officially a great number of plans for churches: and though a large number have been in all respects beyond my criticism, there have been, unfortunately, so many which showed a complete blindness to all the necessities of an English Church service, that I know in directing attention to the subject in a plain practical way I must be doing good. And there seems to me to be a special appropriateness in the choice of the present time for the remarks I have made. We are now, at this Institute, offering the Soane Medallion to the "best design for a church to hold fifteen hundred worshippers." The word "church" will doubtless be interpreted in the broadest way; but it is to be hoped that competitors in such a case will endeavour to realise to themselves a church in which some special kind of religious service is to be carried on, and not a visionary comprehensive establishment, to receive every kind of worshipper, and suit none!

To any of my hearers who neither have churches to restore, nor any concern for the services of the Church of England, I can only repeat my apologies for having forced them to listen for a few minutes to the observations I have had to make. To us who are now so actively engaged in this good kind of work, no detail of church arrangement, no enquiry into church history is without its interest: we see in them the germ of all that symbolical and truthful teaching which does so much to make many of us most earnest disciples of our national and truly Christian art. We do not, indeed, commit the mistake of proclaiming our art to be fit *only* for the House of God; for we maintain, on the contrary, that it is best for everything, and easy of adaptation to meet every want; but we know that we make no mistake, when we say that our art, rightly practised, and thoughtfully and reverently studied and developed, is one of the best handmaids of religion, and of the greatest service to the church: and it is impossible, if this be so, that we can be wrong when we demand of all who restore or re-arrange our churches, that they shall study not only our architectural history, but somewhat also of our ecclesiastical system. Thus, and thus only, shall we make the restorations of our old parish churches an unmitigated source of thankfulness, both to those whose office it is to keep safe watch over them, and to those also whose privilege it is to use them.

The PRESIDENT, Mr. TITE, M.P., said he was quite sure they would all thank Mr. Street for his very able essay. He was sure that all would be of opinion that his hints and suggestions on architectural topics were exceedingly useful. The skill, pains and labour shewed by Mr. Street, in the restoration of ancient churches, had been distinguished; and the skill, pains and labour he had exhibited in the particular instance to which his paper of that night referred were entitled to all praise. He should be glad to hear the opinions of gentlemen on the architectural topics of the paper, and he would call upon Mr. Ashpitel, whose opinions had been referred to by Mr. Street in his paper, and whose learning and experience on the subject were great, to address the meeting.

Mr. ARTHUR ASHPITEL, V.P., said he certainly experienced some little difficulty on being called upon to address the meeting, though it would be highly improper not to rise at the invitation of the Chairman. The paper which had been read was one of unusual length and research, most carefully got up, fortified by authorities, and containing a mass of learning and information seldom brought within the compass of papers of a similar character; and to be called upon to discuss its contents on the spur of the moment involved extreme difficulties, but he would occupy a few minutes in the endeavour to throw a little light on the subject. And first he would remark, that he thought that the church which Mr. Street had described must have been what he might call one of alien foundation. There were not only churches, but abbeys, priories, and other buildings that owed no allegiance to the bishops at home, but were under the control and governance of foreign powers. Accounts of these alien priories, &c. might be found in the later volumes of Dugdale's Monasticon. And he thought it very probable that this church of St. Michael Penkevel, Cornwall, was an alien building, especially as it appeared to be founded by foreign bishops. And in those instances such churches were generally erected for special purposes; they were raised not so much for parochial objects as for such purposes as this very church of St. Michael, which, according to the essayist, seemed to have been erected for the offering up of prayer for the repose of the souls of those persons who left property for that purpose. And there appeared to have been several priests who were associated together, and who lived in a collegiate form. Now, what was called a college, *collegium*, did not mean what we call by that name, and which implies the assembling together of a large number of persons for educational purposes. They were associations for religious purposes, and of any number of persons not less than three, *Tres faciunt collegium*, being a dogma of the old ritualists. And he should not be at all surprised to find that this church of St. Michael Penkevel, was of alien foundation, and erected originally, not for parochial, but for a special purpose, as was indicated by Mr. Street, and for that reason they could understand the special condition in which it was. As to the architecture of the structure it was, of course, impossible to speak with accuracy off-hand. To refer to it with accuracy would require serious study, the critic should see the place itself, the mouldings would have to be seen and examined, for though they had delineations of them in the room, it was impossible for him to give any adequate idea of what they were until he gave them some study. One thing, however, struck him, and that was the very clever way in which light was given there, but the work did not seem to him to be English. In general the English architects, when they had taken a certain assemblage of mouldings to form the mullion of a window, or the jamb of a door, or for any other purposes, if they wished more light to be given they dropped or omitted one or more sets or orders of the mouldings, still preserving the original design of the element of the window. In England, the front rank or order of the mouldings is omitted in those parts of the tracery where more light is wanted, or where the design would be too crowded. He could not at the moment cite an example, but speaking from general recollection the custom was to do the opposite on the Continent. They frequently got more light, or what in France is called *jour* or *claire-voie*, from behind, preserving the front order of mouldings in the inflections of the tracery. While in England the primary order of mouldings are omitted, and the tracery formed of the secondaries. And he could not help thinking, from the general form of the church, which had been described by the lecturer, that a foreign hand appeared to have had something to do with it. It would be a difficult thing, and it might be considered presumption, to express any opinion upon the matter, but it appeared to him that some of the tracery of that church did not look like the work of English hands. Another thing struck him in reference to the drawings, and that was that they showed battlements of peculiar design. We did not see the mouldings returned down the side of the battlements, as well as on the top of the *merlon*, and the bottom of the *embrasure;* in other words, the same moulding mitred all round, till a late period of our architecture. The earliest battlements were small and narrow, and at a great distance apart. Later they were closer together, sometimes only an opening and half apart. But in all these instances the sides of the openings are cut square through, and not even chamfered; and he thought it was not in our country till the perpendicular period the moulding turned down the side of the buttress as well as on the top and the sill. That also appeared a little peculiarity. As he had not seen the place it was impossible to say with accuracy, but the chancel, after all, might not have been so very short; it was, perhaps, a fourth of the building of the present church, but it might have had a fair proportion before the transepts were added. And he thought they should not pronounce any opinion upon that without a further examination. With regard to the steps which should be taken in the restoration of ancient churches, he was inclined to recognise one principle, and that was to conserve with the greatest care everything found in the building. It was with much regret he had seen in many churches the great indifference and carelessness of some architects in treating what they had found in old churches. He would refer to one instance of the kind, an instance which he had had occasion to mention at the Society of Antiquaries, but it would be none the worse for being twice referred to. In a certain church the chancel arch on one side was ornamented by an escutcheon, and on the opposite side was turned the wrong side uppermost. Now, a reversed escutcheon was considered a dishonour, as indicating that something disgraceful had been done, such as that a person had been a traitor, and had been brought to justice. This is technically called by English heralds an abatement. The French heralds deny that any thing of the kind was ever in use in mediæval times; nay, one of the most able of them calls the notion *une sottise Anglaise.* There, however, stood the reversed shield. Shortly after he visited the church for the purpose of further investigation, when he found what is called "restoration" had been going on. The reversed escutcheon had disappeared, every vestige of antiquity polished over, or in some way obliterated, everything made to appear bran new, and the church did not now look so mediæval as the new Unitarian Chapel at Liverpool. He made inquiries about the removal of the escutcheon, and was coolly assured that the place was a great deal better than it was in consequence of the removal of a parcel of old things. In allusion to placing heads on arches he (Mr. Ashpitel) had lately to restore an old church, in which were several heads on the chancel arch, one on the apex, some half way, and others near the springing. He had every stone numbered very accurately, taken down and carefully replaced. In England, and during his travels abroad, too, he had seen bosses and heads carved on the apex, as well as under the labels, but he did not remember seeing the heads placed as in the old Norman church to which he referred. As to our later churches, we certainly had in England some grand churches of basilican arrangement. As to the church of San Clemente, his opinions in reference to which had been alluded to by Mr. Street, he agreed with that gentleman that with, perhaps, a few modifications, it would be well to follow its type. Many of our London churches were very fine specimens of architecture, and no doubt could be much improved on re-arrangement. As to placing men on one side and women on the other in a church, that was a subject to which he paid special notice in the course of his travels abroad. He made inquiries about the mixing of men and women together in churches on the Continent, and was told that they never heard of any other practice, and really where churches were seated with chairs it would be difficult to do otherwise. His friend, Mr. Street, had referred to a paper by him (Mr. Ashpitel) on the subject of the separation of the sexes in places of public worship, and seemed to imply that he had not consulted Bingham on the question. Now, he hoped Mr. Street did not think he was so very short-sighted and forgetful as to go into that subject without looking into that very distinguished authority. He had examined the "Origines," but passages did not appear to be very clear on the subject. He (Mr. Ashpitel) had made investigations in France, in Italy, and in the cantons of Switzerland, and he found that the Calvinists followed the practice of separating the sexes, and the Catholics did not. A priest in one of the Swiss cantons, the canton di Ticino said to him, that this was an innovation of Zwinglius, who was determined to be as unlike the Catholics as possible in every particular. If they went into the Calvinistic churches of France, of Holland, and of Switzerland, they would find that the men were seated on the one side, and the women on the other; and in a series of valuable papers communicated to *Notes and Queries*, an interesting discussion had taken place on the subject. It is true it should not be forgotten that there were special services for the men, when no women were present; and similar services for women only. When he stated on the Continent that there was a movement among some very well-informed and good-intentioned people in the Church of England to separate the sexes in church, the Roman Catholics, with whom he conversed, and of whom he enquired, were very much surprised—"you English are always getting into some blunder from constant desire of change." So that what he (Mr. Ashpitel) had advanced on this subject was not without some authority, and some little shew of reason. It is acknowledged that the separation of the sexes in church was a custom which did partially exist in England; and it seemed to be introduced with the new system, and about the time of the Puritans. But he hoped to be able to look this subject up again, and to see whether their friend, the Editor of *Notes and Queries*, would grant space for further discussion upon it, but he must desist from going further for the present. He thought they were much indebted to their friend, Mr. Street, for coming forward and giving expression to such bold and strong opinions on the subject of the restoration of ancient churches. Before sitting down, he begged to move that the cordial thanks of the meeting be given to Mr. Street for his valuable andinteresting paper.

Mr. William White seconded the motion. As he was intimately acquainted with the Church of St. Michael Penkevel, itself, and with almost all the churches referred to in the paper of that evening, he thought he might venture to say a few words. There were one or two points to which Mr. Street might, probably, be glad to have his attention called. In reference to the opinion of Mr. Ashpitel, as to the Church of St. Michael being the design of a foreign architect, he (Mr. White) thought the whole character of it was sufficient to show that it was designed by an English architect, though, perhaps, the general outline and design were very much influenced by the continental priests who had charge of the foundation of it. As to the heads introduced into the apex of the label, that was a peculiarity, almost unique, but there was a most singular instance of that in the case of the ancient British or Irish Church of St. Perran, or Pyran, at Perranzabuloe, in the fifth century, about the year 470 or 480, and that church had in its arches, heads introduced, very much in the same sort of way as that of St. Michael Penkevel, and, therefore, there might have been, in that part of the country, some tradition of the kind, and this might be the only instance still left. As to what had been advanced by Mr. Ashpitel, in reference to the separation of the sexes in church, he understood that gentleman to say that the practice was introduced as a Puritan institution. But there was now existing in one of the ancient parish records of England, in one of the ancient ecclesiastical books, in which such records were commonly kept, about, he thought, the year 1660 or 1680, an entry to the effect: That Farmer So-and-so and his wife were publicly reprimanded by the churchwardens for sitting in the same pew at church, which thing was highly indecent and improper. He mentioned that as a contemporary evidence of what was, at that time, considered the state of the case.

The PRESIDENT was quite sure they would all agree entirely with the motion proposed by Mr. Ashpitel, and seconded by Mr. White, and would give their hearty and sincere thanks to Mr. Street for his interesting and able Paper. There was one remark which he should like to make; he believed he was the oldest man in the room, and he wished to say that, as architects, they should not forget that churches were built for worship, and that they should be built with a regard to the forms of the service. As men and as architects, let them not be altogether carried away with ancient forms, but rather bring to the consideration of these questions a devotional feeling. They should recollect that this was a Protestant nation—he was not going to quarrel with gentlemen who held a different belief, and adhered to a more ancient form—but they should recollect that the priests of the Roman Catholic Church worshipped for the congregation, but that the priests of the Church of England had to worship with the congregation. That should be considered; that the Reformers distinctly pointed out, and broke down ancient custom, form and principle, in regard to that question, and he admired all that as a Protestant. As to the separation of the sexes in church, that custom could not have been of Puritan origin—it was more ancient—it belonged to the Synagogue in point of fact. The women of the Jewish Church never worshipped with the men, who were now separated from the women.

Mr. ASHPITEL remarked, that so they were in the Greek church, but never in the Latin.

The PRESIDENT.—They should not forget that great reverence was paid by all classes to the House of God in England, and there was no impropriety in mixing the sexes in church. He never saw, and hoped he never should see anything but great reverence shewn by both classes in the house of God, and to separate the women from the men would, he thought, be a little cold, unfriendly, ungallant, and unbecoming. As he hoped they should all meet in heaven without the separation of the sexes, he saw no reason for the separation of the sexes in the church here on earth. He asked them to join in giving a hearty vote of thanks to Mr. Street, for one of the ablest and best papers he ever heard read at the Institute.

The motion was carried by acclamation.

Mr. STREET, in returning thanks, said that he hoped the remarks of the Chairman, in reference to the common worship in the Church of England, would be remembered by Architects in the arrangement of the Litany desk, which symbolized the common worship of priest and people. He was desirous that architects should read the paper of Mr. Ashpitel, read before the Society of Antiquaries, and which had already been referred to, but he denied that the evidence Mr. Ashpitel brought from the Church of Rome was evidence for the Church of England, owing to the antagonism, in many respects, between them at all times. As to the church to which his Paper referred, he believed the theory of Mr. Ashpitel, that it might be of foreign foundation, could not be supported. The foundation was English; the indulgence to which he had referred was foreign.

SOME REMARKS ON HUNGERFORD MARKET.

(Just Removed to make room for the Railway Station.)

By Charles Fowler, Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, Dec. 15, 1862.

The march of improvement in these days is so rapid and sweeping, particularly in regard to railway operations, that without attentive observation we are liable not only to lose sight of existing features of topography, but also our recollection of them. Nothing can show more strikingly the importance of railway traffic than the immense sacrifices that have been, and are still being made to bring it within the easiest possible reach of the public. One of the remarkable instances of this kind is the Railway now in progress from Charing Cross and Hungerford Wharf to the London Bridge Stations, which in crossing the river, and throughout its whole course, is of the most expensive construction. The termini, more especially, as involving the removal of extensive modern buildings of the most costly nature, both as to construction and consequential damages, viz., St. Thomas's Hospital and Hungerford Market, may be referred to.

In requesting your attention to the latter, I would observe, that it may perhaps be deemed a rare occurrence that the same person who originally designed and constructed these buildings should also have witnessed their entire demolition; and on this occasion have to deliver a funeral oration, as it were, over his departed achievements.

Thus, within about thirty years, has been erected this rather extensive pile of building, which, from the solidity of its construction, was calculated to last for centuries, and now has been entirely swept away, and all signs of its existence obliterated, even to the foundations. *Sic transeunt opera architecti.*

I do not wish or intend to deplore this event, but hope that the great object thus to be effected will prove a real boon to the public, and that it will be carried out in a style that may be suitable and ornamental to that central and important neighbourhood.

These circumstances have led me to consider that, without assuming any particular interest to belong to Hungerford Market as a public edifice, yet the entire removal of so extensive a building, and the total change to be effected on that site, deserves some notice or record as a matter of history, and that the Royal Institute of British Architects is the proper deposit of all such records; where they may be found by future enquirers into topography, and probably prove much more interesting to posterity than to the present generation. I have deemed it, therefore, my duty, as one of your oldest members, to present for your acceptance the drawings now submitted, which the Directors of the Company have kindly placed at my disposal for that purpose; and I have produced other drawings by way of further illustration of the subject.

The Hungerford House Estate, as we all know, was one of those aristocratic seats, which, in a connected series, occupied the shore of the river from the Palace of Westminster to the Temple Gardens. On the east side was York House, (a small portion of which became absorbed by the market wharf), and the designation of Villiers, Duke of Buckingham, the last noble occupier, may be seen spread over the neighbourhood, or read off from the Map of London. On the west is the Craven Estate.

The noble family of Hungerford were of Farleigh Castle, in Wiltshire, and the last of the race was Sir Edward Hungerford, surnamed "The Spendthrift," who squandered an immense inheritance, and then, probably with a view to redeem his ruined circumstances, determined to convert his metropolitan seat into a market, for which a royal charter was granted in 1681, the 31st Charles II. This was recorded by an inscription on a tablet on the north front of the old market-house, under a niche containing a bust, said to represent Sir E. Hungerford; but I feel confident that it was intended for King Charles II., as may be seen by the sketch now submitted, which I made just after the removal of the bust.

The market buildings then erected, consisted of a detached market hall, in an open area, surrounded with shops and other buildings, and two short streets, connecting with the Strand on the north, and the river on the south, where were the old Hungerford Stairs and Causeway. Three years afterwards the property was sold to Sir Stephen Fox, and subsequently in the same year Sir Christopher Wren became possessed of one-fourth. Both of these proprietors were at that time engaged in the public service, which probably led to their becoming partners and joint adventurers in the market. Thirty years later (March, 1717) it appears that the entire estate, together with some property adjacent, held under lease from the Dean and Chapter of Westminster, was conveyed to Mr. Henry Wise, whose great grandson, the Rev. Henry Wise, of Offchurch, Warwick, sold it to the Hungerford Market Company, for the purpose of re-establishing a market under the powers of their Act of Parliament.

Our senior members, no doubt, recollect the premises as they stood in 1824. The whole were in a very degraded state, the occupiers mostly of a low class, including a large portion chargeable to the parish; and, considering that the situation is so central, bordering on the main thoroughfare, both by land and water, it is surprising that it should have so long lain in such a dilapidated and unproductive state.

The first suggestion for reviving the market originated with Sir Thomas Tyrwhitt, in June, 1824, when a preliminary meeting was held in the Painted Chamber of the House of Lords, the result of which was the preparing of plans and surveys, negotiations for the purchase of the estate, and a bill in Parliament to incorporate the intended company. A model of the design was also constructed and submitted to the King George IV., at Carlton House, on the 1st of February, 1825, and received His Majesty's approval. Subsequently it was examined by several noblemen and other influential persons, who patronised the undertaking by subscribing for shares, and giving it their personal co-operation and support. Although the preliminary measures were vigorously prosecuted, yet they could not be sufficiently advanced to admit of the requsite notices being given for the Bill in the Session of 1825-26. In the following year there was such a deluge of speculative schemes, followed, as always happens, by a commercial panic, that the promoters were then deterred from proceeding with this scheme; and thus it remained in abeyance until a more auspicious period.

Early in 1829 the measure was energetically revived. Public meetings were held, a good share list was subscribed, the Act of Incorporation was obtained in the following session, and the necessary steps were taken for completing the purchase, getting possession of the site, and erecting the buildings. Although nearly all the occupiers were tenants at will, whose tenancies were determined in the regular course, yet, in many instances, compensations were awarded by the Court of the High Bailiff of Westminster, beyond what would have been due upon ordinary principles of calculation for surrendering a lease for twenty-one years. These, together with many other heavy and unexpected charges and impediments, were felt to be very discouraging to the undertaking at the outset.

The works at the water-side were commenced early in 1831; and on the 18th of June the corner-stone of the Dolphin Tavern was laid by Mr. Agar Ellis, afterwards Lord Dover, with appropriate ceremony.

On the 1st of May, 1832, oyster boats first came up to the wharf, and on the 2nd of July, 1833, the market was formally opened by the directors, proprietors, and others, in procession, followed by boat races, a balloon ascent, and festivities.

STATEMENT OF AREA OF SITE AND BUILDINGS.

	Square Yds.		A.	R.	P.
The Hungerford Estate Proper	8134	=	1	2	30
York Buildings Water Works Company, part of the York House Estate	2371	=	0	1	38
Charles Court Estate (Graham)	1006	=	0	0	30
Plots connected with Villiers Street	536	=	0	0	18
Embankment into the River	3067	=	0	2	23
Total, including street and open areas . .	15,114	=	3	0	19

Portions occupied by buildings, 9077 square yards, or 81,694 feet, just $\frac{3}{5}$ths of the whole.

In regard to the construction of the buildings, it may be stated, that on probing the ground at the river side to a depth of about twenty feet, no solid bed could be found. All was alluvial mud, of about an even consistence; and after much consideration, particularly as to the great cost of piling and coffer dams, it was determined to dispense with them, and rely upon the even distribution of the bearings, and the strength and consistency of the work. (I understand that the piling recently driven for the railway works is from 30 to 35 feet below Trinity datum.) Eventually some movements occurred outwards, owing, no doubt, to the deepening of the river bed, by the scouring effect of the tide, after the removal of old London Bridge; but not the least crack or unsoundness appeared in the masonry. With regard to the market buildings generally, it may be observed, that they were characterized by great strength and durability. There were upwards of 150 granite columns and piers, and more than 6,000 feet of granite ashlar in the wharves and basements. Nearly the whole site was covered with brick vaulting; and in consequence of the unexpected depth of the footings double or two storied basements were formed throughout.

HUNGERFORD MARKET—COST OF BUILDINGS.

Messrs. Grissell & Peto's Contract	£45,307	
Ditto for Stairs and Causeway	1,277	
Additional Buildings, including Metal Roof . . .	5,668	
Additional Basements and other works, including Fittings, &c. .	11,412	
		£63,664
Court-house and Arcade Buildings by G. & P. Contract, and extras.		8,469
Houses East side of Hungerford Street, erected by Baker & Son .	7,826	
Sub-Basement, West side	1,712	
Houses over ditto	10,617	
Extra finishings, both sides	1,099	
		21,254
Water and Gas Services, Paving Wharf and Street, Moorage, &c. . .		4,148
Total outlay, exclusive of Architect and Clerks of Works . . .		£97,535

As a public enterprise or adventure, this market has proved a failure; for, after paying the interest on *borrowed capital*, the annual dividend on the *shares* has scarcely amounted to 2½ per cent. Although the situation and arrangements offered great advantages to the public, they have not been availed of. Experience shows that shops engross all *retail dealings*; and for *wholesale*, although the few markets which engross them are crowded to excess, with extreme inconvenience, yet the salesmen find it *their* interest to confine the trade to the old channels, where they may be more sure of keeping it in their own hands; for, in regard to these matters, *they* and not the producers and consumers, viz., *the public*, are the influential and governing body.

The shareholders of the Hungerford Market made a chivalrous attempt to break through this monopoly, by endeavouring to establish a wholesale Fish Market on their premises. This led to their embarking (much beyond their intention) in extensive speculations for supplying the several kinds of fish, involving heavy charges and responsibilities, beyond all calculation, one step requiring another, so that at one time they had more than a hundred vessels chartered to fish for supplying the market, besides other important contracts and engagements.

Nothing was spared to ensure success, but every effort resulted in defeat and disappointment, until the losses and liabilities became so serious, that the scheme was necessarily abandoned. The causes of this failure were numerous, and, in some measure inscrutable; but the most prominent and intelligible was the determined and active opposition of the Billingsgate salesmen, and for many years afterwards they celebrated the anniversary of their triumph. The loss incurred by the adventurers in these operations during a period of less than six months, was about £36,000! In the course of events connected with Hungerford Market it may be proper to notice the erection of the *Suspension Bridge* by Mr. Brunel, as being attached to the market, and eventually sharing its fate. The Market Company were induced to concur in this scheme, under the impression that the traffic to be brought by the bridge might promote the trade of the market; but as that traffic was carried entirely over the upper or main level of the premises, all the lower court, with its shops, and in a great measure the wharf also, were thrown into obscurity, and greatly depreciated; so that upon the whole the advantage to the Market Company of this association of objects became very questionable. As regards the steam-boat traffic, the change of access so occasioned was disadvantageous.

In the proper order of time, I should have mentioned before, that a party of market shareholders brought forward the first company that was established for running steam-boats for passengers above London Bridge, styled the London and Westminster Steam Boat Company, their vessels being usually distinguished as the *flower boats*, which are still plying successfully. This project was contemplated and put forward in the original prospectus of the Market Company; and experience has justified the anticipation that Hungerford wharf is one of the most central and convenient stations for that important traffic. The example of this first company was soon followed by many others, and competition naturally reduced the profits. The result was, a reduction of fares to a minimum rate, at which, after long and steady perseverance, the investment has become fairly remunerative.

There have been many other petty adventures incidental to the history of this establishment, but I have already recited as much, perhaps more, than deserves your notice. They only served to show the zeal of the directors to turn the property to the best account, and to compensate for the failure of the original objects by adopting various others that were equally unsuccessful.

It might have been observed that alterations were made in the buildings from time to time to meet these objects, but in which I took no part. I have already admitted it was a failure, but by no means a disastrous one, for, after paying off, *in full*, the debentures and borrowed capital, the dividends or returns to the shareholders amounted to 79 per cent., and a provision or compensation having been first set apart for the officers and servants of the Company.

Mr. Fowler proceeded to describe the drawings presented, comprising a general plan, with five views of the buildings, and a sketch of the bust referred to.

A vote of thanks to Mr. Fowler for his paper was carried by acclamation.

ON THE CONVENTUAL ARRANGEMENT OF CANTERBURY.

By the Rev. Mackenzie E. C. Walcott, M.A., F.R.S.L., F.S.A., F.R.S.N.A., *Memb. Corr. Soc. Franç. d'Archéol.; and S. A. de Normandie, &c. &c.*

Read at the Ordinary General Meeting of the Royal Institute of British Architects, Dec. 15, 1862.

In an endeavour to map out the Conventual remains of a Monastery, it is necessary not only to quote authors of credit, but to compare what we read in books and ancient writers, manuscripts and records, with the evidence which we can see, the situation of the places, and the ruins or buildings which still exist. In the case of Durham, a writer of the sixteenth century has left on record the destination of every portion of the existing remains, and the work of identification is, therefore, complete. The dotation charters of Henry VIII and the subsequent orders of Chapter allotting the old buildings as prebendal houses, throw considerable light upon the enquiry in many instances, and a careful comparison of the plans of Benedictine Monasteries with each other, forms an indispensable step in the progress to an accurate and satisfactory elucidation of any particular convent. I cannot agree with the sanguine and too positive assertion of many persons who have studied the subject, that a definite and invariable plan existed in every case. Documentary and architectural evidence are too strong evidences in disproof, but there is no doubt that a strong resemblance subsisted, and the careful study of a single Benedictine house affords a key to every subsequent enquiry into the arrangement of the rest. I now propose to lay before you a plan of Canterbury, founded on the curious design of Eadwyn the Monk, affixed to his Tripartite Psalter, preserved in Trinity College Library, Cambridge, compared with the buildings as they at present exist.

In 1755, the Antiquaries Society published this drawing, which was made before the fire in 1174, but, unfortunately, as Gostling says, it was designed " not only to give such an idea of the Cathedral and its precinct as he could, but to show the course of the sewers, and how the Monastery was supplied with water," and it is " neither a plan, an upright, or a prospect." Although it cannot be compared with the plot of Chester, taken shortly after the dissolution, in point of geometrical precision, it is far more valuable on account of the minute manner in which every detail of interest is indicated. With the assistance of the MSS. printed in Anglia Sacra by Wharton, the Obituary, the Constitutions of Lanfranc,[*] who erected the Conventual buildings,[†] and the works of Somner, Battely and Gostling, a very clear account may be drawn up, of the arrangement and customs of the house,

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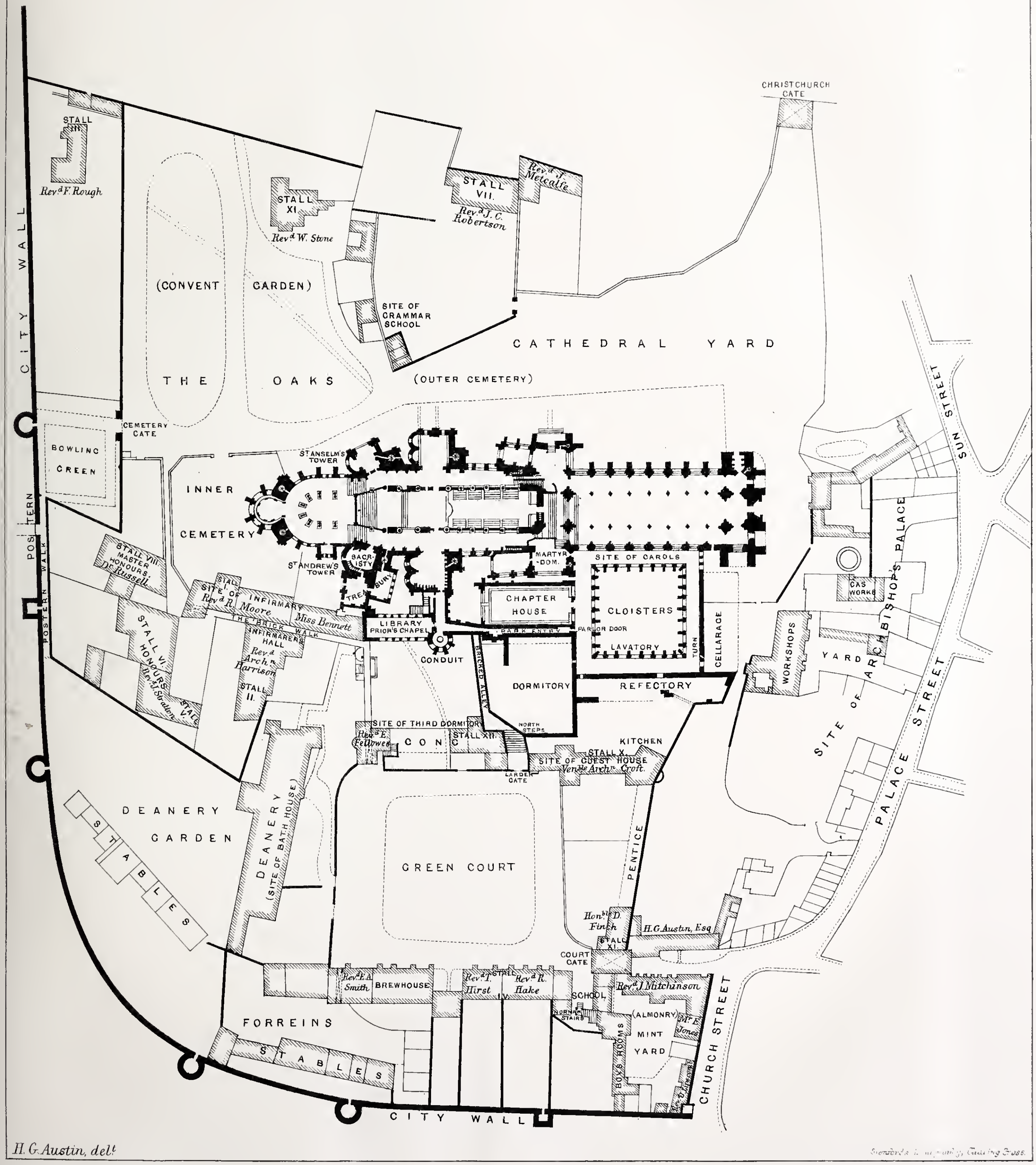
[*] Lanfrancus indignus S. Dorobernensis Ecclesiæ antistes, dilectissimis fratribus suis, Henrico priori, et cæteris, salutem et benedictionem. Mittimus vobis nostri Ordinis consuetudines scriptas quas excerpsimus ex consuetudinibus eorum cœnobiorum, quæ nostro tempore majoris auctoritatis sunt in ordine Monachorum (Works, i. 85). Prior Henry became Abbot of Battle in 1096 [Dart. 178.]

[†] Lanfrancus Claustra, Celaria, Refectorium, Dormitoria, cæterasque omnes Officinas necessarias et omnia ædificia infra ambitum Curiæ consistentia, cum ipso ambitu, mirabiliter miranda ædificavit (Obituar. Cantuar. Ang. Soc. i. 55). Ecclesiam Christi Cantuariensem cum omnibus officinis quæ infra murum ipsius Curiæ sunt, cum ipso muro, ædificavit . . . . . . Domos ad opus monachorum neccessarias, citato opere, consummavit, &c. (Ædmer Hist. Novell. Lib. i. p. 8). Lanfrancus Ecclesiam Christi Cantuariensem cum omnibus Officinas quæ infra murum ipsius Curiæ sunt, cum ipso muro ædificavit (R. de Diceto, s. a. 1071, Ap. x. Script. 484, l. 25. This is a restatement of the fact given in Gervasius, Ib. 1654, l. 61, Dart. 37). Henricus de Estria electus est prior anno 1285, 11 id Aprilis, ædes novas infra Monasterium et extra sumptuosas fundavit, et plurimas dirutas reparavit (Anglia Sacra, i. p. 141),

Conventual Arrangement of Christchurch, Canterbury.

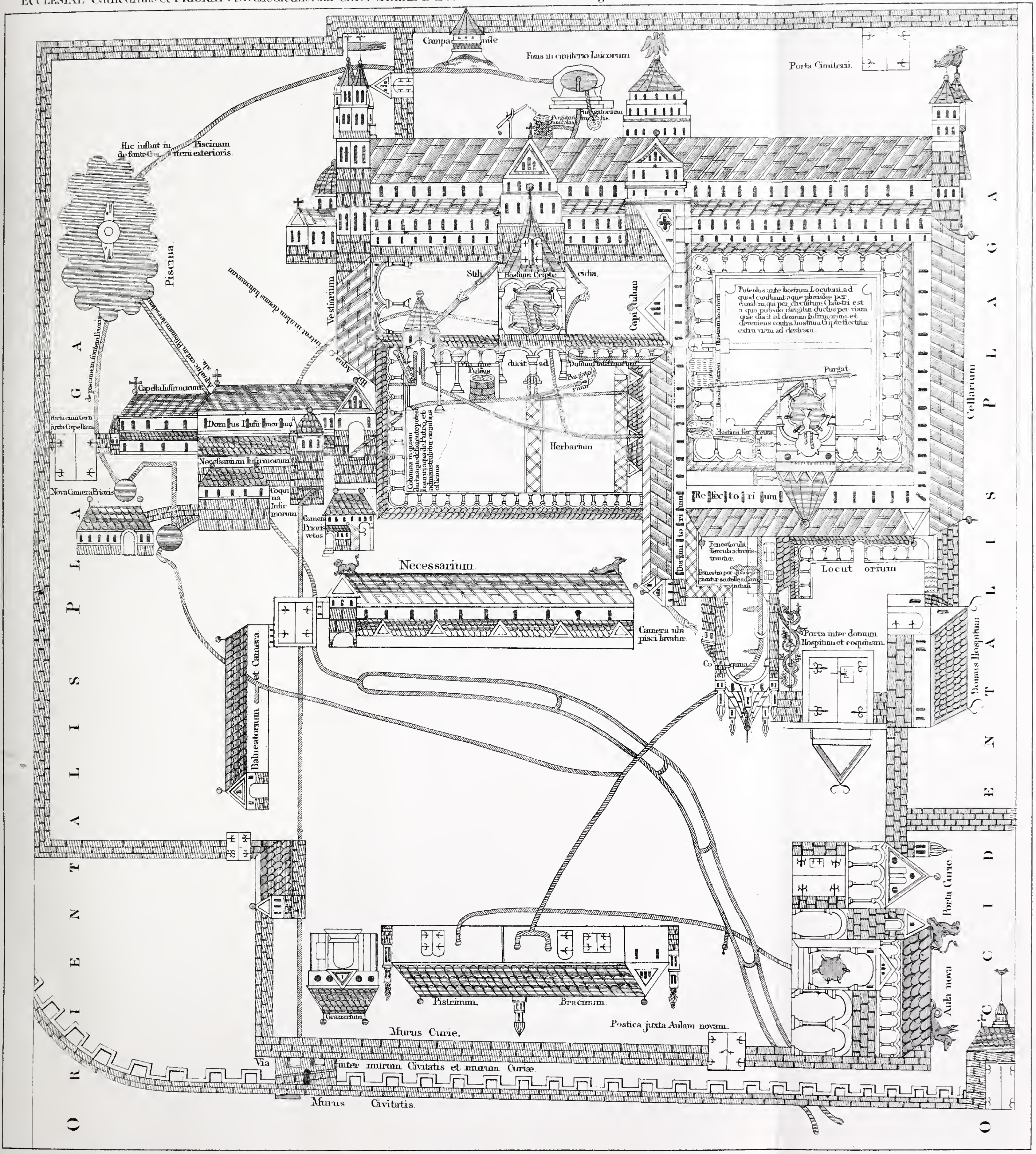
BY THE REVD MACKENZIE E. C. WALCOTT.



H. G. Austin, delt

Stanford's Lithography, Charing Cross.

ECCLESIAE Cathedralis et PRIORATVS Benedictinorum CANTVARIAE facies Borealis. ab EADWINO ejusdem Conventus Monacho inter annos MCXXX et MCLXXIV delineata.


Campanile
Fons in cimiterio Laicorum
Porta Cimiterii.
Purgatorium
Hic influit in Piscinam de fonte Cimiterii exterioris.
Piscina
de piscina in fontem Prioris
Aqua hic exit in piscinam de eadem
Hic aqua intrat in aulam domus Infirmorum
Vestiarium
Stili
Hostium Cripte
cidia
Capitulum
Puteolus ante hostium Locutorii, ad quod confluunt aque pluviales per canalem, qui per circuitum Claustri est a quo puteolo dirigitur ductus per viam que ducit ad domum Infirmorum, et deveniens contra hostium G ipse flectitur extra viam ad dextram.
Hostium locutorii
Fenestra
Purgat.
Hostium ferreum
Via que ducit ad Domum Infirmorum
Puteus
Purgatorium
Columna in quam ductu aqua de fonte potest haurire aqua de Puteo, et administratur omnibus officinis
Herbarium
Capella Infirmorum
Porta cimiterii juxta Capellam
Domus Infirmorum
Necessarium Infirmorum
Nova Camera Prioris
Coquina Infirmorum
Camera Prioris vetus
Refectorium
Dormitorium
Cellarium
Fenestra ubi fercula administrantur.
Fenestra per quam ejiciuntur scutelle ad lavandum.
Locutorium
Necessarium
Camera ubi pisci lavatur.
Porta inter domum Hospitum et coquinam.
Coquina
Domus Hospitum
Balneatorium et Camera
Porta Curie.
Aula nova
Granarium
Pistrinum
Bracinum
Postica juxta Aulam novam.
Murus Curie.
Via inter murum Civitatis et murum Curiæ.
Murus Civitatis.
ORIENTALIS PLAGA
OCCIDENTALIS PLAGA

Stanford lith Charing Cross London.

although extreme care must be taken, in order to reconcile many conflicting statements, and solve several questions of no inconsiderable difficulty. I hope to do this in the following Paper, to which I have subjoined my authorities.

Infirmary.—Upon this site stood an ancient chapel of St. John Baptist, built by Archbishop Cuthbert for a baptistery, a court to examine causes, and a place of burial for the archbishops. It was near the cemetery, which the old infirmary at that time adjoined; the bones in this graveyard were removed, after the fire in 1174, to the great ditch in the angle between the chapel and the infirmary (Dart. 34). Battely places this chapel on the site of the first prebendal garden, and says, that it was burned down in 1174, when the infirmary was also destroyed.[*] When the infirmary was rebuilt, after 1184, a statue of St. John Baptist, which had been rescued, was placed at the east end of the south wall, on the outside of the infirmary chapel, which was dedicated to St. Mary. (Battely, 107, 95, *n. C.*)

The infirmary contained, as at Ely, Gloucester, Peterborough, and Westminster, a hall, lined with the sick monks' cells, and a chapel, in one range, with a gong, a kitchen on the north side, a large larder on the N.W. and a bath-house (Somner, 108). In 1342, Prior Hathbrand built seven chambers for the sick.[†] There is also mention made of the *Long Hall*, which was partly pulled down in 1545 (Hasted, iv. 571, 579). It stood between (that is, eastward of) the treasury and the first prebendal house, on the site of Mr. Bennett's house, and opposite to the sub-prior's lodgings, at the west end of "the bricked passage," extending from the deanery to the first and second [Archd. Harrison's] prebendal houses, and was, at one time, given to the twelfth prebendary. It was, probably, the infirmarer's lodging; a similar building, in the same position, remains at Ely. Hathbrand's chambers for the sick reached as far as the prior's stone hall, or Master's Hall (Hasted, iv. 580).

The Infirmary Hall, built 1342, became part of the second prebendal house, where it remains, but has been divided into several rooms. Hasted describes it as "built of squared flint, with three large Gothic windows upon the east side; on the stone frames on each side, where the arches spring, on these windows are carved the heads of a meagre sick monk, and of a fat healthy one" (Hasted iv. 580). It consisted of three alleys.

The Infirmary Chapel was continued in a line with the hall. The present remains consist of a portion of the wall on the north side, towards the west end, being the corner of the second prebendal house, the whole south wall, with wide circular arches and pillars of small squared stones, forming the north side of the second prebendal house, and the two large arches of the chancel, at the east, which are pointed (Hasted, iv. 580.) The pointed arch, which once divided the chapel from the hall, is also visible. The chapel, dedicated to St. Mary, contained altars of St. Mary—before which a taper was continually burning—of St. Agnes, and St. Benedict. There was a door near the cemetery gate (Eadwyn's plan) or garden gate (Battely, 84, *n. f.*), in the south wall towards the end, [near St. Benedict's altar, which stood in an apse], used by the monks in passing out for exercise into the garden, and called the "Cemetery-gate next the chapel." In the sixteenth century the north aisle of the hall, with the garden on the north side, was assigned to the second prebendal house; and the south side and chapel, with the kitchen, hall, bakehouse, parlour, buttery, the garden before the Prior's gallery, the old garden in the sanctuary, with his tower therein, and his stable next the middle gate, were assigned to the first prebendary. (Hasted, iv. 571.) Of the infirmary kitchen, prescribed by Lanfranc (Wilkins, i. 350), and offices there is no vestige, in consequence of frequent rebuilding since the dissolution. A cross wall between the first and second prebendal houses, taken down in 1579, formed, probably, the west wall of the chapel; and Canon's-row, the passage between these houses, was laid with stone (Somner, p. 107.)

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[*] M. C. lxxiiii. Domus Infirmorum cum Capellâ S. Mariæ et aliis quibusdam Curiæ officinis combusta est (Gervasius, ap. x. Script. 129, l. 22). Cœpit igiter Magister Willelmus causâ fundamenti (scil novæ Capellæ S. Thomæ) Monachorum Cimiterium fodere undè compulsus est multorum sanctorum monachorum ossa effodere, quæ, diligenter in unum collecta, reposita sunt in grandi fossâ, in angulo illo, qui est inter Capellam et Domum Infirmorum, ad meridiem (Gerv. Chron Ib. 1299, i. 41).

[†] Robertus Hathbrand successit anno 1338 et obiit anno 1370. *Aulam Lapideam* quæ dicitur '*Mensa Magistri*' cum septem CAMERIS adjacentibus pro infirmis ; CAMERAM aliam plumbo coopertam juxta *La Gloriet ;* novam COQUINAM construi fecit (Anglia Sacra, i. p. 142. Battely, 44, App.)

The duties of the infirmarer are laid down in Lanfranc's Constitutions c. lx. (Works I. 155), and the rules for the sick in c. xxiii. Whenever a monk was actually dying, two brothers in their turns, two and two, read before him, day and night, the Passion of our Lord, and the Gospels, and, when he became insensible, sang Psalms until he died. As soon as he was dead, his body was apparelled in his habit, having been previously washed in a leaden cistern, which remained in the last century; and sewn up within a haircloth, upon which ashes were strewn in the form of a cross. The body was then laid upon a stone slab in the chapel, which was removed in 1399; in 1404 a similar stone was erected before the holy cross in the chapel [Battely, 94, 95]. If the monk was dying in the infirmary, the fact was announced, by a servant of the Infirmarer, at the cloister door (Wilkins I, 358), but if he died outside the convent, his body was carried on a bier through the Court-gate to the infirmary, and then the servant, as in the former case, summoned the brethren by beating on his rattle (tabula); they then assembled, and passing through the great gates of the Monastery, proceeded to the infirmary, where a service for the dead commenced. (Ibid. 360). Compare the Westminster Custumal, c. 1266, Cotton. MSS. Otho. c. xi. c. xxxiii. fo. 196, 22 b. and c. xxxvi. fo. 34-5, for the account of the trental of a dead brother, and the daily procession to his grave during thirty days after his interment. For my acquaintance with this MS. I am indebted to N. E. S. A. Hamilton, Esq., of the British Museum.

The Sub-Prior's Lodging extended along the south side of Canon's-row, between the infirmary-hall and the library, and was, after the dissolution, converted into minor canons' houses (Boys' plan: Battely, 94,) and since into the Chorister's School, known as Walton. He was the Prior's vicegerent (Ibid. 101). The house was given successively to the eleventh and first prebendaries (Hasted, iv. 579. A. S. I. 148).

The Dormitory, which is built over cellarage, the door of which remains, measuring 105 ft. north and south, and 78 ft. 6 in. east and west, was divided into cells, one being allotted to each monk (Langston's Constit. 1222, c. xl. Johnson's Can. ii. 117). There is a door on the north side, facing Green-court, and another in the cloister, with a loop for light, leading into the cellarage below it. It is figured by Storer, who says [Cathedrals I, p. ii. Pl. 17] that when opened, Aug. 1813, a rude mechanic seriously injured an "admirably sculptured archway." The Prior at one time had his bed in it (Anglia Sacra, I. 143. Battely, App. 44). At St. Alban's the bedsteads were of oak (Matt. Par. 1054), the beds were made of flock, or, in earlier times, stuffed with hay or straw, which was renewed once a year (Wilkins I, 349). The coverlets were of cloth, lined with fur or sheepskin. A mat, a hard pillow, and a rug or blanket completed the furniture (Battely, 96). The partitions (intermedia) of the cells were first introduced by the Clugniacs in the twelfth century, with curtains or trelliced doors, so that the chief might oversee the whole. (Matt. Par. 1095). These cells (Rites of Durham, c. xliii) at Durham remained until a recent period; the lower range of windows which lighted them still exists. At Peterborough we have the date of the construction of "privatæ cameræ" in the dortor, by Abbot Robert, c. 1214 [Swaffham Chron.; Hist. Angl. var. Script. p. 108]. On leaving the choir after Compline, the superior sprinkled the monks as they passed to the dormitory. Having meditated and prayed, each monk, apparelled in his habit, lay down; the chamber was sprinkled with holy water and, the doors being locked, a light was kept burning all night (Lanfranc I, 144. Martene Anecd. 1681), and if any one awakened the rest, he was compelled to do immediate penance before the cross in the centre of the room. The Abbot, with an attendant, went the circuit of the Monastery the last thing at night (Martene de ant. Mon. rit. c. xii.) The Sub-Prior made the rounds at Durham (Rites. ch. xlix.) The patrol or Circa also went round the dormitory. (Wilkins I, 347. Lanfranc's Works I, 144, 145). After matins on Rogation days, the brethren were allowed to go to their beds again and enjoy an extra sleep (Ib. 122). On these days, Whitsun Tuesday and Good Friday, they went down into the choir barefooted (Ib. 122). Meridian or noonday sleep was taken after sexts. (Ib. 122, 125), Sometimes all the bells were rung to waken the sleepers (Ib. 127). Perpetual silence was observed, and two watchmen (vigiles) kept guard—one until midnight, the other till daybreak. No one was allowed to wake the superior (Lanfranc, Works, i. 141).

In 1266, the chamberlain gave £100. towards leading the dormitory. (Anglia Sacra, i. 195). As the monks had to attend the night hours, a door and passage in the fifteenth century were constructed, leading out of the south-east angle of the dormitory, by the Baptistery and Prior's Way, into the north wing of the choir transept, which still remains. (Gostling, 164). The dormitory was divided into the greater and lesser dortor, the latter, probably, being allotted to the junior monks. Of the former, which was dismantled in 1547 (Gostling, 160), four Norman windows remain on the west side over the cloister; and the lower pannels of two-blind perpendicular windows, added by Prior Chillinden, 1397-1411 (Ang. Sac. i. 147), are visible on the north wall of the Chapter house. He also built the new way already mentioned, "below the shaving house" (Dart. 37), which means, probably, that he restored the lower passage to the crypt and the upper gallery, the so-called Baptistery having formed a conduit and the shaving house.* By Lanfranc's Constitution (Wilkins, i. 351) the monks were to be shaved in the cloister (Lanfranc's Works, i. 104, 158), but in 1266 we find that, in St. Augustine's Abbey, Canterbury, lay barbers were admitted as a boon, and the operation was directed to take place "in the chamber next the bath house" (Thorn. Chron. 1915).

At the north-west angle there are remains of a newel staircase, which communicated with the leads, and some windows. Gostling (p. 163), apparently in error, judging from the present position of the bricked passage, speaks of a *Chapel*, 22 ft. long by 6 ft. 6 in., and 18 ft. high, between the dormitories, converted in his time into a staircase and two small rooms, one above the other. Indications of a double gable are to be seen in Eadwyn's plan. An oratory adjoining the dormitory, in which the celebrant and assistants vested on Christmas day, is prescribed by Lanfranc (Works, i. 94). A chapel of St. Mary was attached to the dormitory of St. Augustine's (Thorn. 2038). Gostling says that it had an arched door in the west wall, to be seen in his time in the "bricked alley" [*i. e.* the terrace-walk leading to the passage to the Baptistery]; on each side were doors opening into the two dormitories, and on the north side was a fourth door. Twenty or thirty feet beyond the west door was one of large size, probably opening on a passage between the galleries of the dormitory, which, he thinks, was divided into three alleys (p. 163). The central alley may have formed the chapel if he is correct; which the present appearance of the bricked alley would induce one to doubt. There are several pillars of the cellarage remaining.

The *lesser dormitory* was converted into the *Long Hall*, or common refectory for the minor canons and choir after the Dissolution, but was in 1559 made into the ninth prebendal house (Battely, 56), and afterwards attached to the twelfth stall (Hasted, iv. 571. Gostling, 138, 162). It stood along the south side of the Green-court. Adjoining it was the *Gong*,† between it and the prior's lodge, on the east side of which was a door to this range of the building, much of which remains; it was converted into three houses for minor canons (Gostling, 163. Rites of Durham, c. xliii.) Outside the wall of the gong, on the south, was a passage between the dark entry and the dormitory cellarage. Southward of this passage there are some old walls which, probably, formed part of the *third dormitory* which lay parallel with the gong, between it and the church, being identical with the "Cella Novitiorum" of Lanfranc (Wilkins, i. 354). The large mass of stonework at the angle of the North Steps, with a staircase from the cellarage, still remaining, contains a Norman elliptic window, which lighted the hall of the gong.

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* Thomas Chillinden, Prior promotus 1390, obiit anno 1411. Claustrum quoque, DOMUM CAPITULAREM, MAGNUM DORMITORIUM, cum Novâ Viâ versus Ecclesiam et subtus DOMUM RASTURÆ de novo fieri fecit.

† The Gong built by W. of Wykeham, at New College, Oxford, retains its arrangements complete.

The Refectory, built over cellarage, to which a door and stair remain on the north-east angle, 130 ft. long, and about 15 ft. to the floor or chamber of the upper chamber or loft, was built at an unknown period (Hasted, iv. 575). It stood on the north side of the cloisters, as at Gloucester, Sherborne, and Chester. In 1550 the third prebendal house was built out of its remains (Hasted, iv. 571). A fragment of the north-west angle, and a large portion of the north-east wall, containing a doorway to stairs which, probably, led down to cellarage (Hasted, iv. 576) remain. The refectory was built on the level of the cloisters. A pointed door at the north-east corner of the cloister has also been preserved. The great doorway from the cloister [figured by Storer, pl. xiv.) fronts the lavatory, and in the depth of the wall adjoining it, on the west, is the passage to the reader's pulpit, from which the lections were read during hall-time. This staircase may have been continued to give access to a loft or upper chamber, of which there are marks of the flooring, 15 ft. above the level of the refectory. Upon the east wall of this room there is a transitional Norman arcading of Purbeck marble, marking its importance. The suggestion may, therefore, be made whether the western portion did not form a loft or dining hall, used on common days, as at Durham [Davis' Rites, ch. xxxix, xliv, xlix], and the east end the dormitory chapel or oratory, for at this point the wall of the dormitory is solid, while southward, towards the cloister, it is pierced with windows. A similar passage is to be seen at Rochester, and the pulpits of Chester, Shrewsbury, and Beaulieu, are familiar to all architects. The refectory was fitted up with seats, and provided with wine-flasks (justitiæ) and drinking-cups (scyphi) (Lanfranc's Works, i. 107). On Maunday-Thursday the convent assemble here to drink the cup of charity, and the pulpit (analogion) was brought from the minster, by the sacristan, for the use of the deacon. All the signals were made by the rattle or small bell (cymbalum) (Ibid), but at Westminster by the skilla. There, when the Abbot dined, the Convent stood at the lower end of the hall in two ranks bare-headed, until he passed by: they, then, keeping their faces eastward, waited till he bowed and rang his bell; at this signal all took their places at the tables, and the refectorar, with one blow on his skilla, directed dinner to be served.

By Langton's Constitutions, c. xliv, the fare was the same for all (Johnson ii. 119). This consisted of cheese, fish, and fruits, meat being restricted to the prior's table, the guest house, and infirmary. The charge of the hall was given to the cellarer, and not, as in other convents, to the refectioner. In an old bill-of-fare preserved by Battely (p. 96), each monk had two soles for dinner, or one plaice or mackarel, or four herrings or whitings, or five eggs: beer was the ordinary beverage. Strict silence was observed (Decret. lib. iii, tit. xxxv, c. vi).

The monks assembled before dinner, either in the church or, in winter, in the calefactory or common house hall (Rites of Durham, ch. xlv. I), a room with a fire in it, usually adjoining the chapter house (Martene de Ant. Mon. rit. L. viii).; after sexts in summer, and nones in winter, all the gates being closed, and the prior having rung the bell; after washing at the lavatory they entered the hall, and saluted the cross, which was over the superior's table (Raine's Durham, 95. Rudborne Hist. Maj. L. III, c. xiii. Chron. Abend. I, p. 47), and when he had taken his seat they sang grace. The monks then took their allotted seats, in messes varying from three to ten. The hebdomadarii served the dishes, and each monk let down his cowl over his eyes and eat in silence while the lections were read; when dinner was over, grace was said, and the broken meat and bread were carefully collected for the service of the Almonry (Martene de ant. mon. rit. c. ix). At the caritas, before collation and compline, a cup of wine was served to each monk; while the lection was being read, two tapers were lighted on the superior's table, and three on each of the lower tables (cap. xi). Supper throughout the year was composed of bread, fruit, or thin cakes [Ib. T. iv. 107. See also Monast. Angl. I, p. xxxvii. xlviii., II. 207. Rites of Durham, c. xxxix]. Upon great days the cellarer furnished festival clothes for the table [mappæ], and the chamberlain provided a better sort of towel [tersoria], and white napkins [manutergia] were spread over the ordinary equipment of the tables [Lanfranc I, 130, 136].

Along the north-west side of the dormitory was a passage which communicated with "the chamber in which the fish was washed," and an octagonal Kitchen, which was on the east side of the Larder Gate still standing (Hasted IV, 575). On the west side of this court-yard was the larder or pantry (Battely, p. 96), with two windows, through one (the "dresser window," Rites of Durham, c. xliv. xxxix.) the food for the hall was brought from the kitchen, and through the other, dishes were passed to be washed (Eadwyn's plan).

Returned along the west side of this room, and also along the north wall of the refectory, to the west, was a covered cloister forming the *Parlour*, and facing the Larder Gate and Guest House. This room (Paralitorium, Winchelsea's Statutes) was used for interviews with friends or traders, and for conversation. At Peterborough there was a "regulare locutorium" [Rites of Durham, c. xxxiii.] At Abingdon there were two parlours, one on the east side of the cloister, next the chapter house, the other upon the west, under the abbot's chapel. [Hist. Abend. II, 286].

The Larder Gate was called also, the "Inner Gate, near the Guest House," and was provided with a porter's chamber (Somner, 112).

There is a curious brickwork arch, 26 ft. in span, with a spring of 3 ft. 6 in., and jambs of squared stone and flint. Gostling calls it "an alcove, tiled overhead and plastered, with a bench wainscotted at the back" (p. 159). It, probably, was a reconstruction of old materials.

The Guest House (Aula et Camera Hospitum) and Parlour are mentioned in Winchelsea's Statutes as portions of the Outer Court (Somner, p. 111). Fragments of an octagonal *Kitchen*, and a stair-turret, built by Prior Hathbrand in 1338-70 (Anglia Sacra I, 142. Hasted IV, 575) remain against the wall of the *Guest House*, now the seventh prebendal house (Gostling, 135), which retains, in the ground-floor, considerable remains of the old Norman building, in which an arch communicates with *The Pentice*, lying between the tenth and eleventh prebendal houses, a covered way by which the meat was conveyed from the guest house to the almonry. It is 8 ft. wide, and the timber roof is supported on the west side by the party wall of the archbishop's palace, and on the east by substantial posts, about nine or ten feet high. It extends to the Court Gate (Gostling, 135, 157) 159. *The Pentice Gate*, adjoining the guest house, had over it the chambers known as "Heaven," and "Paradise," the former built by W. Woghope, who died in 1397 (Gostling, 158). Hasted says that, in his time, they were paved with square tiles (IV, 571, 581). There was a Heaven Chamber at Peterborough, and a Jerusalem or Bethlehem Chamber at Westminster, probably, deriving their designations from tapestry or wall paintings in distemper. There were also Heaven Chambers at Winchester (Hist. of Hants I, 18) and Westminster (Mem. of Westm. 221).

The *Stillicidium* or ancient Conduit is now miscalled the Baptistery from the font having been placed in it, owing to a misconception of Gostling (p. 166). Its history is as follows. Prior Wibert, who died in 1167, "made the aqueduct or watercourses with the pools or reservoirs, lavatories, and baths, the water he wonderfully conveyed for a distance of nearly a mile from the city (the North Holmes), within the court, and thence through all the offices of the court" (Anglia Sacra, I, 138). Thos. Goldston, Prior, in 1495, "with great wisdom and prudence, constructed the subterraneous aqueduct, a very laborious and costly work, made with vaulted masonry, on the south side near the church, from the sides for the convenient drainage of heavy rainfalls. For during heavy rains the whole crypt of the Virgin, with all the adjacent chapels, was sometimes flooded owing to the defects in the water-courses; and, in consequence, the approaches to the glorious Virgin were rendered difficult of access to the crowds who came to visit it out of devotion. This aqueduct extends in length from the way which leads from the south door of the church towards the city, through the church cemetery, near its foundations, as far as the Sub-Prior's chamber; and from the Sub-Prior's chamber by the mansion of the Prior it is finally extended and carried up to the head of the third dormitory" (Ibid, 148).* There was a conduit, apparently of Prior Goldstone's time, built on the north side of the green, and removed above two centuries ago. Eadwyn's plan furnishes us with the courses of the sewers, and the manner in which the monastery was supplied with water from the roof of the church, by conveying the rainfall into fit reservoirs. From one of these in the outer churchyard, a pipe was laid down to a larger one in the convent garden; from this another pipe, laid down from the eastern part of the church, distributed water to the apartments and offices in this quarter. Another in the cloister-yard collected the rain which fell on the roofs for the use of the infirmary, kitchen, scullery, bakehouse, and brewhouse, by means of pipes. On the south side of the church a well appears with a contrivance for drawing the water; and another in the *Herbary*, or kitchen garden, with a pillar, to the top of which water was raised for the use of the offices. In another unpublished skeleton diagram of Eadwyn, in further illustration of the complete and ingenious mechanism of this hydraulic system, a sewer traverses the *Green Court*, and on the north-east side is a water-house, shown also on the larger plan, with a water course extending under a tower of St. Gregory's Priory, through a field, an orchard, a vineyard, and under the city wall, into the priory. At the present day the supply-springs being higher than the cathedral towers, the water is received in a cistern at such an elevation that it can be distributed to the upper stories of the houses, as it was in the twelfth century. At Westminster, Gloucester, Durham, and Worcester, the water was brought into the conduit from great distances.

The *Conduit* itself is a circular building, about 17 feet in diameter, raised on stone pillars instead of walls, with a group of four central pillars, carrying the vault (Gostling, 106, 131). This building stood in the centre of the south alley of a large Norman cloister, of which the north wall (if it ever existed) has wholly disappeared. A portion of the east alley still remains. The western alley was formed by a wall with a door upon the south-west side, being the exterior of a building with four gablets, which was attached to the east wall of the dormitory, and, probably, formed the lesser dormitory. The garth was divided by a wall running north and south; and the western portion formed the Herbary, the walls of which are chequered, in Eadwyn's plan, apparently the mark of a main or outside wall. In the south-east angle was a stillicidium, similar to Wibert's conduit, and that over the lavatory in front of the refectory. The western part of the south alley, now known as the "Dark Entry," is called the "Way to the Infirmary," by Eadwyn. According to Lanfranc's Constitutions, the infirmarer's servant came along it to announce at the door opening into the great cloister that a monk was dying (Wilkins, I, 358). Over this passage are arches, in which Mr. Austin discovered rings embedded for the purpose of supporting lamps at night.* This gate is marked on Eadwyn's plan as the *door of the parlour*, the bays next the cloister forming a place for the monks to assemble in before chapters and processions, and for other purposes. For instance, when a fugitive monk was reconciled, he was received in the guest house, or an office of the cloister, and having been unfrocked in the parlour, was conducted into the chapter house to receive discipline, and then returned to the parlour (Locutorium) to revest himself (Wilkins, I, 354). The east side of the alley was occupied by the *Prior's Chapel.*

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* AQUÆDUCTUM cum stagnis et lavatoriis et piscinis suis; quam aquam ferè miliario ab urbe intra Curiam et sic per omnes ipsius Curiæ officinas mirabiliter transduxit Prior Wibertus (Somner, 141. Anglia Sacra I, p. 138). Extra quoque Ecclesiam, AQUÆDUCTUM subterraneum satis onerosum, ex parte australi prope Ecclesiam, ex lateribus, ex cæmento opere testitudinario firmissimè constructum, ad pluviarum inundationes commodè recipiendas, satis prudenter ac providè construxit; quæ quidem pluviarum exuberantia totam Virginis Cryptam cum cæteris capellis adjacentibus, ex defectu aquæductûs, nonnunquam operuerat; sicque aditum satis difficilem ad Virginem gloriosam, causâ devotionis visitandam omnibus illùc confluentibus omnino exhibuit. Qui quidem AQUÆDUCTUS distenditur in longum à viâ quæ ducit ab hostio Ecclesiæ meridionali versus civitatem, per CÆMITERIUM Ecclesiæ prope fundamenta ejusdem, usque ad CAMERAM SUPPRIORIS et à CAMERA SUPPRIORIS per mansionem Domini Prioris usque ad caput TERTII DORMITORII finaliter protenditur atque traducitur. [Ibid. 148.]

In connection with the water system I must mention the *Bath House* of Eadwyn's plan, it occupied the site of the deanery; and the *Lavatory* before the refectory door, of which traces remain, but the whole Norman stillicidium has disappeared. This laver was provided with towels (Wilkins, I, 349), and similar lavatories may be seen at Westminster, Gloucester, Chester, Peterborough, and Norwich. It was used by the monks in washing before dinner and church (Lanfranc, I, 122), and in the ceremony of the Maunday. (Rites of Durham, c. xl, xxxviii, xxxvii). All the monks were required to be shaved and bathed two days before Christmas, and on the Wednesday in Holy Week. The time of bathing was at any hour between prime and compline. Each monk had his proper seat, before which a curtain was let, and servants were in attendance. After the bath they returned to the cloister. (Lanfranc's Works, I, 91, 92, 104). In some convents twenty or thirty at a time washed their feet together in long troughs [alveis]; in other houses ablution was performed singly in foot pans (catanis). (Ib. p. 86). On Good Friday there was a special ablution with hot water. (Ib. p. 116). The monks washed their heads after shaving in the cloister. (Ib. p. 158). Those who sang the midnight mass on Christmas Eve had a place arranged by the servants of the chamberlain, with a good fire, basons, towels, and hot water, having previously combed their heads, contrary to the usual custom in which this order was reversed. (Ib. 93, 94). This chamber was the calefactory, (Monast. Anglic. I, xxxiv), or Pisalis *v.* Pyrale; used also for providing fire for the censers, and giving warmth to the monks in cold weather.

The *Cloisters,* as at Sherborne, Chester, Gloucester, &c., are on the north side of the church, exceptionally to the ordinary rule.† It was under the control of the cloister-prior. (Wilkins, I, 347). In it the monks were shaved (p. 351), novices had a special place (p. 354), and the children kept school (p. 356), and the monks studied. A considerable part of the day was spent in the cloister, in reading, singing, and, when license was given, in conversation. The cloister and offices were cleaned on the five great festivals, rushes were strown, and cushions placed on the seats in the refectory, chapter house and cloister. (Lanfranc's Const. Works, I, 127). In the cloister upon Maunday Thursday the cellarer and infirmarer introduced the poor folk, who previous to their entrance had washed their feet in hot water furnished by the chamberlains. The Maunday was then performed, and two pence and a drink of wine were given to each person by the cellarer or chamberlain, while the brethren were ranged in order facing them, and, as in the choir, one sitting between two standing (Ib. I, p. 108). On Good Friday, the rattle was beaten in the cloister, before the cellarer's lodging, and the infirmary, to waken the brethren. (Ib. p. 113).

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* In the Westminster Custumal precise rules are given for lighting the cressets and candles at the four corners of the cloisters after dusk, especially before the doors of the church and dormitory, and their extinction after the monks had retired to rest, and the sub-prior had gone his rounds.

† The site was here determined by a cloister, which existed before Lanfranc's time, and was described by Eadmer:—Alia verò turris in plagâ aquilonali, è regione illiùs, condita fuit in honorem B Martini, *Claustra,* in quibus Monachi conversabantur, hinc indè habens (Gervasius, Ap. x. Scrip. 1292, l. 23).

On Sundays and Epiphany after Tierce there was a procession in albs through the cloister, and the priest went through the domestic offices (Ib. p. 95); there was another with lighted tapers at Candlemas passing through the great doors. (p. 96). On Ascension day it went with banners and reliquaries round the court of the monastery, or through the cloister without those accessories (p. 133); on the Feast of Dedication it went through the great doors. (p. 135). There were frequent processions in Lent with Litanies, and on some occasions with bare feet. (pp. 98, 99). On Palm Sunday the prior and chief persons were presented by the sacristan with palms, and the rest with flowers and leaves; the procession moved in the following order—servants with banners, an assistant with holy water, two cross-bearers, two taper-bearers with censers, two deacons with the gospels, lay monks, the children and their masters, and then the brotherhood, the prior walking last, with hymns and anthems, while all the bells were rung (Ib. p. 101). On Rogation-days, while the bells sounded, the precentor commenced the chant, and at the minster doors the chamberlain's servants gave a staff to each of the monks. (p. 123). On Easter Eve there was a procession in albs, singing the Miserere, to the new fire from which the paschal taper was lighted. When the fire was consecrated the priest sprinkled it with water, lighted the incense from the charcoal, and then the sacristan having kindled a taper on the end of a pointed staff (hasta), and a lantern being lighted and carried by the master of the children, the procession returned to the choir, with incense, cross, and hymns. The cellarer's servants rekindled with the fire remaining in the cloister all the hearths in the offices which had been extinguished previously. (p. 118). At twelve o'clock on Easter Eve, April 19, 1180, the day of the re-entry of the choir, the archbishop, mitred and in a cope, blessed the new paschal fire, and then preceded the choir, vested in albs, and singing the hymn "Inventor rutili." (Gervase, ap. x, Script. 1300, l. 52, &c.) In the two bays northward of the "parlour door," Eadwyn calls the window of the cloister, "the iron window," this was screened or grated, and may have been the place for kindling the fire. The bleeding was performed here.* (Ib. c. xii). In the *North Walk* every fifth bay was divided by a wall (Gostling, 169) to form a series of carols, square enclosures for study, such as those which remain at Gloucester, Worcester, and Beaulieu. (Rites of Durham, c. lxi). Prior Sellyng, 1472-94, glazed the South Walk for the studious, and "made texts, which are of late called Carols." (Anglia Sacra, I, 146). The word Textus, usually, but in its secondary sense, in mediæval writers, means the Gospels; a Register (*e. g.* Textus Roffensis), the text of a book, &c. The word Carol has been barbarously derived from quadrella, a square place. Textus primarily means texture, and so here trellice, plaited like woven work, or wicker; a screen of interlaced bars. Carole is derived from Carola, "opus saltatorium," intricate work, like the figures of a dance (carole), used in the Præmonstratensian Statutes, dist. I, c. 9, "in Claustro Carolæ vel hujusmodi scriptoria," &c., and in a visitation of the Treasury of St. Paul's, 1295, "Carollæ ferreæ ante Crucem et S. Radegundam." The word Karole was in use in Normandy to designate a screen, grate, or lattice, Clathri s. columellæ fabrefactæ (Ducange, s. v, Carola, III, 193), so that the Text or Carol of Selling was simply a partitioned enclosure. The express words of the Obituary are Australem verò partem claustri, ad usum studiosorum fratrum vitreari fecit; ac ibidem novos Textus, quos Carolos ex novo vocamus [precedentes, Dart], perdecenter fecit, (Ang. Sac. I, 146), which Dart and his modern copyists convert into "Texts written or painted on the walls." At Durham (Rites, c. xli) in each glazed window of the cloister in the north alley there were "three pewes or carrells," where every old monk had his carrell; "the forepart had carved work that gave light in at their carrell-doors of wainscot." They were used between dinner time and vespers. In the south alley of the cloister of Gloucester are twenty carrells; each had a small window made out of the great window, two in each bay; their width was four feet, and they extended with their partitions six or seven feet into the alley. (Carter's Hist. of Glouc., pub. by Soc. of Antiq.) In the West Alley there is a doorway which formerly communicated with the cellarer's lodgings [Dart. 35]. That on the south-west was always used by the archbishop,* and shared in the reconstruction of the cloister by Prior Chillenden, 1390-1411. (p. 143). The north-west doorway is provided with an angled aperture (Hasted IV, 576) for the passage of a cup of wine without opening the door to a monk who was weary after the labours of the day, by permission of the prior. It was known as a Tunn. A similar aperture remained in the same position at Winchester in Dr. Milner's time. Hasted thought it was used for the passage of parcels, and recent writers have evaded any explanation. In the East Alley there are five doorways. The southernmost was the only approach to the church from the cloister, through it (hostium qui præest martyrio) the archbishop with the pyx in his hand, at three p. m., led the convent on April 19, 1180 (Gerv. 1301, s.); next to this is a small doorway to the Lady Chapel Court, and used by the chaplain of Warham's Chantrey, when the martyrdom was crowded. (Gostling, p. 184). To this succeed the doors of the chapter house, and parlour, and to the north the *Iron Door* of Eadwyn's plan, probably as at Westminster and Durham (Scott's Gleanings, p. 7; Rites of Durham, p. 71, c. xlii) opening into the treasury, a portion of the cellarage destined for the safe keeping of valuable property and muniments.

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* The Chronicle of Peterborough furnishes some curious anecdotes with regard to the quarterly blood-letting, which Mr. Jefferson, in his Book of Doctors, shows was an ordinary custom of the period (vol. II, ch. i). It was a privilege of the high steward of Canterbury, after attending the Primate's Enthronization Feast, to stop three days at one of his nearest manors, in order to be bled (Storer I, p. 8.) In the Westminster Custumal, c. xv. fo. 36 b. there is a chapter on the order of bathing and blood-letting. Comp. c. xxxi. fo. 3.

The *Chapter House* is on a level with the cloister. The central door is flanked by large windows, which enabled the monks of dependent houses to attend the proceedings of a Synod or General Chapter, when they could not be accommodated in the building itself. In the time of Prior Eastry two new gables were built (Gostling, 176), but Prior Chillenden, 1390-1411, undoubtedly erected the building above the lower interior arcade. (Anglia Sacra, I, 143). This noble room measures 92 by 37 feet, and is 54 feet in height. There are thirty-five stalls on each side, with a prior's chair in the east wall, in which the archbishop was seated after his enthronization. At the north-east corner and adjoining it two doors were barbarously cut through the walls, when this chamber was converted into a sermon house, with galleries, pews, a pulpit, and latticed regal closet with the date 1545, (Hasted, IV, 577; Gostling, 176). These abominations were removed towards the close of the last century. In Gostling's time, and till within a few years of the close of the last century, (Hasted, IV, 577), it was used as a chapel for daily prayers, owing to a curious circumstance. "In K. James' time, L. C. Jefferys informed the chapter that the Presbyterians had a petition before the King and Council, representing this as a place of little or no use; and desiring that they might have it for their meeting-house. The person who was entrusted with this message, being a member of the choir, proposed the making it a chapel for early prayers. 'This will do,' says the chancellor, 'advise your dean and prebendaries from me to have it put to that use immediately, for if the Presbyterians don't get it, perhaps others will whom you may like worse.' " (Ibid). The archbishop's visitation of the cathedral is held here, and the Statutes are publicly read on June 22, and other chapters are opened here, and adjourned to a more convenient [?] room built for that purpose, and called the Audit House. (Ibid, p. 177).

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* "Archbishop Courtney began the work of the present cloister at his own charge, and for the south side, which leads directly from the palace to the Martyrdom, he rebuilt it." [Dart. 37.] Plura bona fecit Ecclesiæ suæ, scil. ad fabricum Claustri et murorum clausuram circa gardinum Celerarii, etc. Obit. Archiep. Cant. A. S. I. 60. Prior d'Estria [Eastry] paved the cloister in 1295.

The rule was read in the chapter-house on Easter eve and on the Rogation days (Lanfranc, Works, I., 122-127), novices were admitted (Wilkins, I., 356), discipline was administered (ib. pp. 354-357), and the death of a monk announced by a messenger in it (p. 361). On Tuesday after the 1st Sunday in Lent the keeper of the books laid out on a carpet here the monastic library, when all borrowed books were returned and others lent, the names of the readers being entered. (Lanfranc, Constit. I, 98). The conventual maunday was held here, and the pulpit prepared for the deacon who read the Gospel. (Ib. 110, 111). The daily chapter was held after tierce in winter, and after prime in summer, at the sound of a bell rung by the superior. On entering, the monks bowed to him, to each other, and the Cross in the centre of the room. The chief acts in chapter consisted of, 1, reading the martyrology; 2, announcement of festivals; 3, prayer, followed by reading the rule, or on Sunday and festivals a homily of the Fathers; 4, commemoration of the departed, and 5, living benefactors; 6, nomination of hebdomadarii or officers of the week; 7, public confession of faults, judgment thereon, followed by absolution or discipline; 8, the election of priors and officers, and 9, once a year the recital of charters. Strict silence was observed with regard to capitular acts. (Martene de Ant. Mon. Rit. IV. c. v.). The daily collation before compline (Ib. Anecd. 1226; De Ant. Mon. Rit. I. c. 8) consisted of readings from the Bible, the rule, lives of the Fathers, &c. by the lector from the pulpit, before which two tapers burned, followed by an address from the Superior. (Ib. IV. p. 128). There were Sermons here on Christmas eve and the first Monday in Lent. (p. 93-115). A taper burned before the chapter-house until a dead monk was buried. (p. 256). A general absolution was given here on Thursday in Holy Week. (p. 128). In early times priors and benefactors were buried in the chapter-house.

The Prior's Lodging.—The prior was elected in the chapter-house in the presence of the whole brotherhood. After a short sermon by the Archbishop one of the monks presented to him the roll of the convent; the primate then, having made a scrutiny of the votes, retired, and having selected a name returned to the chapter, where he declared the prior elect. A procession was formed, and, Te Deum being commenced by the precentor, or in another instance the Miserere begun by the Primate, moved through the choir to the high altar. After service, the Archbishop installed the prior in his seat on the north side, and took his own place on the south; they then returned to the chapter-house, where the prior sat on the primate's right hand, and the ceremonial was complete. (Battely, p. 99, Anglia Sacra, I. 175). In the vacancy of the see the monks elected and the new archbishop simply confirmed the prior. The prior maintained a large establishment, comprising a chamberlain, marshal, esquires, clerk, notary, farrier, cook, groom, pantryman, butler, messenger, keeper of the chamber, stable-man, keeper of the meads, grooms, laundress, ink-makers, &c. (Battely, 44, App.).

The Table Hall, in which the esquires dined with the steward, was called also the Stone Hall, or Mensa Magistri, and apparently intervened between the fifth and second prebendal houses, northward of the infirmarer's hall and infirmary chapel: a large massive wall, still standing in the fifth canon's house, having formed part of it; it was built in 1342 by Prior Hathbrand, and adjoined the infirmary; it became part of the second prebendal house. (Anglia Sacra, I. 142; Hasted, IV. 571). Battely mentions various apartments in the prior's lodging [camera prioris] before 1258, the *Great Chamber* with paintings; the *Little Chamber* with a chapel and new chimney; the *Long Chamber* with the new chimney, the *new chamber* in the old plumbery, with a chapel and chimney. It included, in 1291, the new chamber, with garde robe, chimney, ceiling, painting, and pavement. In 1294 the new pantry and new kitchen were leaded at a cost of £13. 18s. (App. p. 44).

The Prior's Chapel under the library was built by Prior de St. Elphege, 1258-63[*] (Anglia Sacra, I. 140; Somner, 96; Batteley, 91; Gostling, 167), and was dedicated to St. Mary. Above it a modern library has been built, and it forms now merely a passage to the dark entry Prior Goldston, after 1495, decorated the chapel, but left the oratory with its screen (clausura) on the north side next the church for the convenience of hearing the masses sung in the choir. (Anglia Sacra, I. 148).[†] Through the chapel the prior went to church. Prior Sellyng, 1472-94, adorned the library with a very beautiful ceiling, and fitted it with books for the use of the studious. (Ib. p. 445).[‡] The chapel and library were plundered in the Great Rebellion, and burned many years after. (Hasted, IV, 579).

The Old Chamber stood on the east side of the brick passage, as appears by Eadwyn's plan, on the site of the house afterwards allotted to one of the six preachers. The staircase still remains. (Hasted, IV. 578). The way to it from the Green Court led, apparently, under an archway below the east end of the gong. (Gostling, 131). Considerable additions were made at an early period, for on the east side of the infirmary kitchen Eadwyn marks the prior's *New Chamber*. In process of time the bounds of these chambers appear to have been the green court on the west, the convent garden on the east, the monastery wall on the north, and the infirmary on the south. (Battely, 92). There are two staircases remaining on the east side of the bricked passage, one of which led to the prior's chapel and the other to the domestic portion of his lodge. From the *Prior's Hall* stairs led into a stone apartment called the *Paved Chamber;* this room with two other chambers, the prior's bed in the dormitory, his study, and other houses attached, were repaired by Prior Chillenden. (Battely, App. 44; Anglia Sacra, I. 143). At Winchester there was an upper room called the garite or prior's garryt (Hist. of Hants, p. 201), of which gloriet may have been a corruption at Canterbury. There is, however, a church of la Gloriette (an upper alcove or summer-house) at Caen, from which town Lanfranc came; and in 1338-70 Prior Hathbrand built a leaded chamber next the *Gloriet.* (Angl. Sac. I. 142). Prior Sellyng, 1472-94, built the *Stone Tower*, next the chamber called the Gloriet, but then known as the *Prior's Study*, leading it and glazing the windows. (Ib. 145).[§] Prior Goldston, 1495-1517, added the *New Lodging*, next the prior's old house called gloriet, with chambers, upper rooms (cænacula), solars, and other appendages, with the fair porch towards the court: he also renewed much in the *Prior's Vestry* called the *Wardrobe.* (Ib. 149).[||] Halstead identifies the *Stone Hall* with the dean's parlour, and the *Paved Chamber*, the *Bed Chamber* and *Study* with his study and the apartments northward of the old stone staircase in his house. (IV. 578).[*] These constitute the south end of the deanery: Dean Andrews destroyed the ancient windows of the east wall. The *Commission Chamber* on the north side of the infirmary hall was converted into two parlours for the second prebendal house. (Ibid). The *Long Chamber* on the north side of the infirmary abutted on the honours, and was divided between the fifth and sixth prebendal houses: it was identical with the *Great Chamber* of the honours (Ibid, 571), and has been long since pulled down. *The Master Honours*, abutting on the convent garden, were the state apartments of the prior, in which he entertained distinguished guests. Bishop Buckingham died in them, having been a tenant after his resignation of the See of Lincoln. These rooms, with the *Gallery* and *Chapel*, were given to the eleventh prebendary. (Hasted, IV. 571). The *Lesser Honours*, on the east side of the brick passage are identified with the gloriette by Batteley (p. 93, 94), but by Gostling fixed to the site of the fifth and sixth prebendal houses; he also marks the prior's *Study* as the room over the brick passage which has a stone newel staircase, and points out two old remains of the prior's lodgings in a staircase with two small tenements on the north at the corner of the green court, and another court on the south, serving as the back stairs in the deanery. (p. 132).

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[*] Rogerus de S. Elphego prioratum ab anno 1258 ad 1263 tenuit, qui CAPELLAM inter Dormitorium et Infirmariam honorificè perfecit (Ang. Sac. p. 140).

[†] Thomas Goldston prior promotus circiter annum 1495, CAPELLAM PRIORIS decoravit ac ORATORIUM dictæ capellæ annexum, cum CLAUSURÂ ex parte septentrionali Ecclesiæ contiguâ, ad missas in Ecclesiâ commodè audiendas, reliquit.

[‡] LIBRARIAM etiam supra CAPELLAM PRIORIS situatam perpulcrâ celaturà adornavit; quam etiam nonnullis libris instaurari fecit, ad usum maximè literarum studiis deditorum.

[§] Willelmus Sellyng, Prior electus anno 1472, die 10 Sept. obiit anno 1494 ædificavit TURRIM quandam cameræ Prioris vocatæ LE GLORIET contiguam; quam quidem TURRIM modò STUDIUM PRIORIS appellatam, opere lapideo a fundamentis erexit. erectamque interiùs decenter ornavit, ac cum coopertur̀a de plumbo fenestrisque vitreatis plenè consummavit (Battely, App. 44).

[||] Novum quoque ædificium vulgariter vocatum, NEW LODGING, juxta antiquam Priorum mansionem vocatam LE GLORIET, satis pulchrum atque famosum cum cameris, cænaculis, solariis et cæteris appendiciis idem ædificium concernentibus cum PORTICU decenti versus Curiam ac cum omni apparatu ad ornatum dictæ mansionis pertinente, magnificè ac laudabiliter consummavit. In VESTIARIO quoque PRIORIS vocato Le Wardrop . . . . de novo quamplurima instauravit. Denique PORTAM Ecclesiæ exteriorem versus civitatem opere decenti ac pulcherrimè insculptam à fundamentis erexit (Prior Goldston, obiit anno 1517. Ang. Sac. I. pp. 148, 149).

After the dissolution, to the dean were allotted the *Chapel* with the *Closet;* the *Old Chequer* with the chambers belonging to it, with the cornlofts and cellars, adjoining the west end of his garden; the *Brew-house*, the *Bake-house*, the *Gate-house* with the *Prior's Stables*, the Great *Barn Sumpter Stables*, the *Carters' Hall*, all situated in or adjoining the Foreigns, the garden before his hall door and the wine-cellars. (Hasted. IV. 578).

The Obedientaries or Great Officers, the cellarer, chamberlain, sacrist, treasurer, precentor, and two penitentiaries extra et intra (Anglia Sacra I. 175) were nominated by the Archbishop out of a list of names proposed to him. (Battely 101). The Legatine Constitutions of Otho, 1237, prescribed general confessors or penitentiaries in every cathedral church (c. v. Johnson Canons II. 155). At Peterborough this officer had a house. The Statutes of Exeter appointed a penitentiary in conformity with the custom of other cathedrals. The obedientiaries were required half-yearly or quarterly to render their accounts to auditors appointed by the Convent, or to the superior, according to the custom of the monastery. (Langton Const. 1222, c. xxxi. Johnson II. 115).[†]

The *Precentor* presided as director over the services; distributed the copes for processions; kept the books; sent out briefs announcing the demise of any of the brotherhood, and sat on the right hand side in the choir. (Lanfranc, Works, I. 147-9).

The *Treasurer* collected and gathered in all the rents; his inner and outer *Treasury* adjoined the north wing of the choir transept; his *Exchequer* stood on the site of the tenth Prebendal house in the Green Court. In 1301, the new *Treasurer's Stable*, with the solar and little granary, cost £7. 8s.; and in 1291, the *new Tower* beyond *the Treasury* cost £10. (Battely, App. 44).

The *Chamberlain* provided mats, blankets, beds, bedding, razors, combs, towels, horse-shoes, glass in the dormitory, and the clothing of the monks. He had under him tailors, skin dressers or peltmen, shoemakers, and laundry servants (Somner 109; Lanfranc, Works, I. 151). The old clothing was given by him to the poor. (Langton Const. 1222, c. xl ; Johnson Can. II. 117). The tonsure was sometimes given in the chamberlain's cell. (Wilkins I. 354).

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[*] Ædem quoque LAPIDAMEAM, juxta aulam Prioris, quæ vocatur PAVED CHAMBER, cum duabus aliis cameris, lectumque Prioris in DORMITORIO cum STUDIO et aliis domibus annexis laudabiliter reparavit.

[†] In the Westminster Custumal the following officers are specified:—the Prior; Sub-prior or prior of Cloisters and Master of the Naries; the third and fourth Priors; Searchers of the Cloisters; Precentor; Succentor; Sacrist; Pitanciar; Hostillar, external and internal; Gardener; Refectorar; Chamberlain; Almoner; Sub-almoner; Infirmarer; Cellarer; Sub-cellarer; and Sub-chamberlain.

The *Sacristan* had charge of all the ornaments, plate and furniture of the church; the bells; the chandlery; funerals; cemetery; and preparation of the hosts. He also delivered the crozier to a new archbishop. (Somner, 96; Battely, 109). At the foot of the steps to the Trinity Chapel from the north choir aisle, a door near Archbishop Bourchier's tomb opens into the Sacrist's *Chandlery*, a chamber which had a double grated window over Saint Andrew's Chapel. A similar room adjoined Gundulph's Tower at Rochester. The paschal taper weighed 300 lbs.; the seven-branched candlestick held six of 7 lbs. a-piece, and the middlemost of 8 lbs. Besides these were the candles used at the throne in the nave, the little thrones in the crypt, those called "Jube" used in reading lections in the choir, candles for masses and for the watchers in the choir and dormitory; "riders" for those who rode on conventual business; candles for the circuit of the shrines ["ad buettas"] and in vigils of the dead; candles in the Infirmary and Prior's Chamber. These were delivered out by the sub-sacrist. The other officials of the sacrist were the keeper of the wax-house, chief and four under bellringers, church watchman, plumber, clerks of Saint Mary's Altar, and of the Tomb and Martyrdom, glazier, plate cleaner, church laundress, usher or door-keeper of the choir, and the servant of the Shrine (Battely, App. 45; Somner, 95). The Sacristy, consisting of three chambers, reached by a wall staircase, remains on the north side of the choir, and over the TREASURY [armariolum], "the armoury or church arsenal," says Somner, "yielding them weapons or muniments, wherewith to secure unto the monks their possessions and privileges." (Ib. 96). At Rochester, we likewise meet with the "armoury." In 1285-90 there is a notice of the Exchequer *Chamber*, with the lodgings [diversoria] (Battely App. 44). Over Saint Anselm's Chapel, on the south side of the choir, was the *Sub-Sacrists Chamber* (Ibid. 105), with a chimney (Gostling, 245), which was used in baking the hosts (Wilkins, I. 349). Similar arrangements are found at Bristol and Lincoln.

The Cellarer's Lodgings, as at Winchester, &c., ran the entire length of the west alley of the Cloister. This obedientiary is called by Lanfranc (Wilkins, I. 349) and Winchelsea "The Father of the Monastery." (Somner, 110). He kept a court or hall mote in the hall, still existing as a mason's shop; the entrance to it formerly was on the opposite side to the Palace Court, by a door, over which was the carving of the Descent of the Holy Spirit upon our Lord, and a statue of an archbishop. He provided all the food for the convent and the guest-house (Lanfranc Works, I. 151, 153). Some idea of the onerous duties of his office may be gathered from the list of his servants in 1322, which includes a sub-cellarer, steward and clerk of the liberties; steward of the guest-hall; porters of the outer court gate, hall gate and cemetery gate; the pantryman of the hall and cellar; the usher of the cloister; watchman of the court; sutler of the hall; cup bearer; dishkeepers of the refectory; larderers; and cooks of the convent and hall; salter; usher of the kitchen; stoker; porter; carver; wine and beer drawers; cup keepers; stablemen, coachmen, knife keepers, huntsmen, gaoler, and keeper of the cellarer's mead. (Somner App. 36). The bake-house and brew-house were under his charge; and as he had to find additional food, he was to be apprised of the times of bleeding (Wilkins, I. 351). The north-west door from the cloister to his lodgings has been mentioned; that on the south-west was a double doorway [figured by Storer, pl. 6], which had in the windows the name, arms and rebus of R. Deering, cellarer in the time of Henry VIII., who was executed at Tyburn, for his share in the imposture of the Holy Maid of Kent (Somner, 110). It was through a Norman doorway at this point (and not by the cellarer's door, as some recent writers unreasonably have imagined) that A'Becket passed into the cloister to go into the cathedral at the time of vespers, before his death, being followed by his murderers.* "When Henry VIII. new founded the cathedral he restored all the site of the dissolved monastery to the dean and canons, except the *Cellarer's Hall* and *Lodging*, which he reserved to himself. They were afterwards annexed to the archiepiscopal palace, by means of Cardinal Pole; the king gave, in exchange for these buildings, three acres of land to the archbishop." (Battely, 96; Gostling, 117).

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* Hic locus Martyrii ex opposito habuit HOSTIUM CLAUSTRI, quo ingressi sunt quatuor illi diaboli . . . ut caput S. Thomæ . . . . palmâ martyrii decorarent (Gervasius, Ap. x. Script. 1293, L. 61). Cùm jam in ecclesiâ aliquot gradus ascendisset ecce! à tergo quatuor illi armati per Claustrum, exertis gladiis Ecclesiam cum impetu ingrediuntur (Ib 1415, l. 58).

The Offices of the monks, who were fifty-four in number at the dissolution, included besides those already mentioned, the master of the fratry, bartoner, granarer, chanter, master of the tables, keeper of the manors, warden of Canterbury College, succentor, third chanter, master of the anniversary, chancellor, third and fourth prior, prior's chaplain and sub-chaplain, &c. (Battely, App. 52).

The monks were bound to observe the rule of St. Benedict and the Dialogue of St. Gregory. They were compelled to surrender all private property, under penalty of being denied burial in the cemetery, or of having mass said for their repose. (Lanfranc Canons, c. 2; Johnson Can. II. 13; Walter's Canons, 1200, c. xv.; Ibid 93). They could not make a will (Langton's Const. c. xlv.) Their dress was a black frock, with facings of black or white skin of lambs, cats, or foxes; and a cowl. They were not allowed to leave the monastery without a companion (Ib. xliii.; Walter's Canons, 1195, c. xiv). If guilty of disobedience, they were sent, by way of penance, to another monastery (Langton's Const. c. xliii.) In certain cases they were allowed to visit, by way of relaxation, a manor-house called the Misericord, under the charge of two grave seniors (Ibid c. xlviii.) At Peterborough and Tewksbury and Westminster the Misericord was the house in which the monks on gaudy days were allowed to eat flesh. The age of admission was fixed at eighteen years (Ibid, c. xli.)

The *Green Court* was formerly called the Court of the Priory. On the north side was the *Granary*, now known as the Foreigns Gate [Forinsecus, external] upon the east corner. In 1301 £7. 8s. were spent in building the new Treasurer's Stable with the solar and little granary (Battely App. 44); the Great Grange for hay is mentioned before 1285 (Ibid). To the west was the *Dean's Brew-house*, from which the present water-house was divided off in the last century. Beyond it was the *Dean's Great Hall*, repaired before 1285 (Battely App. 44), which was demolished by the Puritans "for being profaned by the king's scholars having acted plays there," according to Gostling. Between this building and the north hall stood the fourth Prebendal House. Before 1285, mention is made of the *Great Grange* for hay; and of a payment in 1303 of £8. 5s. 10d. for the *New Granary* in the *Brew-house* (Battely App. 44). In Eadwyn's plan the long range of the *Bake-house* and *Brewhouse* adjoins the *Granary* on the westward, and a *Postern* is marked in the enclosure wall, a little to the north of it, near the New Hall. Prior Chillinden, 1390-1411, within the circuit of this court built the *Granary*, *Shoemaker's Shops*, *Prior's Stable*, and the *Walls* with the *Towers* of the Court, and other houses which required reconstruction owing to their decay.[*] (Anglia Sac. I. 143). The deanery occupies the site of the *Bath-house*.

The *Court Gate*, or Gate of the Priory, with the Porter's Lodge and Pentice, was allotted to the tenth and eleventh Prebendaries (Hasted, IV. 581, 575; Gostling, 136). After this arrangement, the *Porter's Lodge*, which had been on the south side of the gate, was removed to the north side. The porter's duty was to keep out all idle or suspicious persons from entering the Court, to lock the gate at curfew, and deliver the keys to the cellarer until next morning. (Battely, 102).

The New Hall of Eadwyn's plan, or North Hall of the charter of Henry VI, built over cellarage, formed the east side of the almonry, and lay northward of the Norman staircase. The west wall, with its fire-place and part of the cellarage, remains. In it the Bailiff or Steward of the Liberties held his court once in every three weeks. (Somner, 112). It was also called the Oriel, in the sense of an upper room, and the hog hall, as some believed, "from the dressing of hogs in the undercroft, for which," says Somner (p. 111), "it were absurd to think it were built," and he then suggests Spelman's correct derivation that it was the hoch or high, in reference to its erection over cellarage. Gostling, however, led away by a desire of punning, contrives to make a double mistake by placing the guest hall here, adding, "the reader, perhaps, may think he need not have gone so far for a probable conjecture, but that it was as likely to get this nickname from the greedy and hoggish behaviour of such company as was usually fed there." (p. 135). The ninth prebendary formerly had the north part of this hall allotted to him, but he afterwards exchanged it with the auditor for the house since attached to that stall in the Oaks, in 1730, when the Hall, which measured 150 by 40 feet, with its substructure, and two chambers over a room in the Mint-yard were destroyed. Against the west wall of the hall were built two houses for the six preachers. (Hasted, IV, 571, 581; Gostling, 137; Somner, 110). The substructure of ten bays and three alleys, was divided into a porter's lodge; a passage to the almonry; and the prison of the Convent. In 1295 £13. were paid for the new gaol; and before 1285 repairs were made in the great hall near the court gate. (Battely, App. 44). In the centre of the building was the Norman Staircase still remaining (figured by Storer, pl. 10); in the south wall of it was a door to stairs, leading down to a well. Over the remaining arches of this substructure Mr. Austin built the King's School in 1855.

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[*] Certa etiam ædificia intra ambitum Curiæ consistentia, viz.: SATRINUM, GRANARIUM, STABULUM, que **PRIORIS**, et muros cum TURRIBUS ejusdem Curiæ, domosque quamplurimum necessarias longo tempore dirutas de novo fecit ac emendavit.

The Almonry contained a chapel of St. Mary and St. Thomas à Becket, which Somner confounds with the prior's chapel. (p. 96; Hasted, IV, 581). In 1319 Prior Eastry founded here a chapel and chantry for six priests. Henry VIII, after 1545, established a Mint in it (Battely, 97; Hasted, IV, 582); and in 1581 the buildings were converted into the King's School. (Gostling, 139, 141, 151; Somner, 111, 113). Prior Chillinden, 1390-1411, rebuilt the priest's hall and the children's hall in the almonry. (Ang. Sac. I, 143).* On the west side of the yard was the *Almonry Gate*, at which the alms and dole were distributed to the poor; these embraced the old clothing and the broken meat of the prior's chamber, master of the infirmary's hall, refectory, and guest house. (Langton's Constit. 1222, clxiv; Somner, 112), and the entire dinner of the convent on Good Friday. (Lanfranc's Works, I, 117).

The Close, &c. The enclosure wall was built by Lanfranc, according to Eadwyn, Diceto, and Gervase. (Battely, 88). It was subsequently rebuilt after 1177 on the grant of new lands, and an exchange of some ground with St. Augustine's Abbey, by which the monks were enabled to enlarge their enclosure on the south. By similar exchanges between 1287 and 1317, they were in a position to increase their garden, and extend their wall upon the south-east. (W. Thorn, Chron. Ap. X, Script. p. 2142). Between North Gate and Burgate on the north east was Queningate Lane, which became part of the cathedral precinct by grant of Henry II, confirmed by Henry IV. (Somner, 103, 112, 113). *A Postern* still remains in the wall, which was rebuilt by Prior Sellyng, 1472-94, from St. Michael's Church to the old convent-garden wall. (Ang. Sac. I, 146; Battely, 89; Gostling, 12). The piscina with its cistern stood on the north-east of the cathedral (Eadwyn's plan), and was repaired before 1285. (Battely, App. 44).

In the south wall was St. Michael's or the *Old Cemetery Gate*,† which opened from Burgate into the cemetery opposite St. Michael's Chapel.[*] There was also a second gate mentioned in the reign of Henry III, as facing Mercery Lane, and opening into the court of the cathedral, and in 1174 as the *Church Gate.* It was rebuilt in 1517 by Prior Goldston, and is now called Christ Church Gate. (Ang. Sac. 149; Somner, 104; Battely, 90; Gostling, 64); a raised causeway led from it to the south porch of the cathedral. (Gostling, 121).

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* In Elemosynaria verò Aulam Presbyterorum et Aulam Puerorum cum aliis diversis ædificiis de novo construxit (Ang. Sac. p. 143; Battely, App. 44). At St. Paul's the Almoner had charge of the choristers, who were in consequence called "the Children of the Almonry."

† A Cemetery Gate is mentioned in the Westminster Custumal. I hope that these allusions to a MS. of unequalled interest will induce some patient and competent antiquary to decipher its contents, and print them. The volume was drawn up by order of Abbot Ware [Sporley's MS. Claud. A. viii. fo. 54], and was considered so precious that it was kept "in conclavi" apart. Although beautifully written, it has been so seriously injured in the fire at Ashburnham House, as to be occasionally illegible.

The eighth Prebendal House has in its garden a mound, on which stood a detached *Bell Tower* (Campanile Clocarium)[†] marked on Eadwyn's plan (Somner, 103), as at Salisbury, Worcester, Chichester, Lichfield, Norwich, Westminster, &c., to which Leland refers: "There was a mighty great ring, called Conrad's Ring, that, after, was broken and made into a smaller ring, and so hanged up by likelihood in the low 'closche' (clochard) in the church-yard, now of late clean pulled down." (Itin. V, p. 6). Prior Wibert gave to the clochard the great bell, which required thirty-two ringers to toll it. (Angl. Sac. I, 138). Prior Eastry built the "new long clochard," on the north, c. 1302. (Somner, 144). Hasted says the bell tower was destroyed at the Dissolution (IV, 574), no trace remains of the site of that built by Eastry.

The chantry house of Archbishop Arundel forms now Mr. G. Austin's house. The western portion of the *Precinct* or *Outer Cemetery* was allotted for the burial of the laity. (Gostling, 106-108.) The remainder of the precinct on the west was called the *Court of the Church* or *Monastery.* (Battely, 90). The *Inner* or *Conventual Cemetery* lay between the *Cemetery Gate*, which adjoined St. Anselm's tower, the *Convent Garden*, now called *The Oaks*, and the infirmary chapel on the north. Its western boundary was formed by the Trinity chapel and Becket's crown, and on the east it was enclosed by the Master Honours. The *Inner Cemetery Gate*, a Norman structure, has been rebuilt in the east wall of the Oaks. Some of the early priors were interred in this enclosure, which formed the cemetery for monks and persons of distinction. (Somner, 149; Battely, 90; Hasted, IV. 574). On the west side of the Oaks is the OLD SCHOOL HOUSE, afterwards called the Plumbery, which connects the convent with the great school of Theodore, in which the study of Greek and the ecclesiastical chant were first introduced into England. To the south of it was the ninth prebendal house; and still more eastward the third prebendal house, and at the end of its garden the door opening into the conventual *Bowling Green.* (Gostling, 121, 122, 138; Hasted, IV. 574.)

In conclusion, allow me to acknowledge the kindness of Mr. Henry Austin, F.R.I.B.A., the chapter architect, who accompanied me over the buildings, read over my MS. with me, made several suggestions of value, and furnished the plan on the wall which is an indispensable adjunct to my observations. For similar accounts of other monasteries ample materials remain; but when we have tediously to reconstruct these noble establishments by detached passages in chroniclers, the notes of local topographers, prints and plans, and the comparison of fragments of ruin, the fine saying of old Fuller sounds and is accepted as a prophecy, "When their substance is gone, their very shadow will be acceptable to posterity."

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[*] Murum etiam qui ab Ecclesiâ S. Michaelis usque ad veterem murum, HORTUM CONVENTUS claudentem, se protendit, construxit (Ang. Sac. I, 146), Cum PORTA CIMETERII per officiales regis post triduum fuisse aperta, etc. Gervasius (Chron. Hen. II, 1526, l. 42, and 1519, l. 64).

[†] M.C.lxxiiii. non Sept horâ quasi ix^{a}·, austro ferè ultra humanam æstimationem furente, accensus est ignis, aitte *Portam Ecclesiæ* extra muros Atrii (Gervasius Chron. P. 1^{a} 1290, l. 18). Wibert, Prior obiit anno 1167, 5 Cal. Octobr. Signum magnum in CLOCARIO posuit quod triginta duo homines ad sonandum trahunt; in die anniversarii instituit expendi 40 solidos in refectorio ad refectionem fratrum (Ang. Sac. I, p. 138. Somner, 141). Confirmatio de concambio terræ ex parte meridianâ Cimiterii Ecclesiæ Christi juxta Campanile (Chron. S. August. Cant. ap. x. Script. p. 2256).

The CHAIRMAN, A. ASHPITEL, V. P., said, though it was very late in the evening, he was sure they should be very glad to hear any gentleman in proposing a vote of thanks to the lecturer for his most able and interesting paper.

Mr. FERREY, Fellow, (having been called upon by the Chairman) said he had really no observations to make on the very learned and able paper which had that evening been presented to them by their friend Mr. Walcott. It was, he thought, to be very much regretted that Mr. Austin, who must be so well acquainted with the building in question, and who had been incidentally alluded to in the paper, was not present that evening. The paper was one of great interest, and he was sure that they should all derive great benefit from it when it was printed. It was too late to make remarks upon the paper that evening; but on a future evening the subject might be followed up by gentlemen who had given attention to it. He proposed the best thanks of the meeting to Mr. Walcott for his able and excellent paper.

Mr. JOHN W. PAPWORTH, Fellow, in seconding the proposal, would observe the reticence recommended by the Chairman: but would beg that the lecturer, before putting his paper into the hands of the printer, would decide upon the justice of his use of the term fresco. If the lecturer meant merely distemper-work such as had hitherto been found in churches, it was to be hoped that he would influence his brother archæologists to use the technical terms, so that in future we might know when the antiquaries had really (if not for the first time) found a painting in true fresco* in England. Mr. Papworth lauded the euphuistic phraseology employed by the lecturer, such as "application of discipline," which in plain English meant the use of a cat of nine tails.

Mr. FERREY hoped that when Mr. Walcott's excellent paper was published there would be appended to it a plan of the buildings referred to, so that upon it they might be able to follow their friend in all his admirable remarks.

The CHAIRMAN suggested that they should have a plan from Mr. Austin embracing all the parts referred to in the paper. It would be remembered very well that on the north side of Canterbury Cathedral there was a large mass of buildings, which showed some very curious remains; and when Mr. Walcott's paper was printed, it would give them an immense amount of information, and might lead to an interesting discussion. As to the fact of there being two cloisters, the same was the case at Ely, and he thought there were vestiges of such at York. And where those two cloisters occurred he thought one was for the priors and the monks, and the other for the clergy. What was said about the Hog Hall, which was very likely the Hoch or High Hall, threw a very curious light on an archæological puzzle at Oxford, respecting the origin of the name of a place called the Pig Market, of which no one seemed to be aware. If the term Hog Hall had been corrupted in the one case, so it might have been with that of Pig Market in the other. As to the meaning of the word *carol*, there seemed to have been a confounding of the word *carel*, derived from the French *carrele*, a square enclosed, with *carolle*, a short song or chant, a word as old as Chaucer. He thought the two things had been confounded together. The paper of Mr. Walcott might probably lead to another, and to a curious discussion upon both. He was happy to say that the paper would be printed and distributed amongst the members with the Christmas part of the Transactions of the Institute.

The vote of thanks to Mr. Walcott was carried by acclamation.

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* Fresco being the soaking of water-colour throughout the thickness of the finishing coat of plastering while wet, and Distemper being the application of water-colour with size on finished dry plastering, Bastard Fresco is true fresco mended in effect by distemper touches: the Distemper in both cases can be removed by the use of hot water or of a wire brush.—J. W. P.

The Rev. Mackenzie Walcott, in acknowledging the vote of thanks, said, that as regarded the use of the word *fresco* in the paper, he would adopt the word *distemper*, at Mr. Papworth's suggestion, and wished he had influence to induce his archæological friends to follow the example. As to the two cloisters, he only knew of four instances of a double cloister, at Westminster, Gloucester, Bristol, and Lilleshall; and in all those cases it was immediately connected with the infirmary. As to the use of the terms *Hog Hall*, the Chairman had referred to a presumed difficulty with Oxford men about the origin of the name of a place known as the *Pig Market*. There was no connexion of ideas. The so-called Pig Market was the very beautiful vestibule of the Divinity School, and during the civil wars was really used as a Pig Market, whence its name at present. As regarded the word *carol*, Ducange had stated that *carola* primarily meant a dance, but was still the term employed in Normandy to denote the grate or lattice work screen round a shrine, or in a front of a chapel. Thus the word *carole*, in a secondary sense meaning intricacy, like the figures of a dance, was used as a synonym for trellice of wood or metal. *Carolus* was essentially a distinct word from *quadrellus*, *quarreau*, or *carreau*, a field measure as Ducange explains it; or *carellus*, a wheel; a round cushion, etc., both of which had very different meanings; *quarrel* was still the name for a diamond-shaped pane of glass, and formerly meant the square-headed bolt of a cross-bow.

Mr. John W. Papworth reminded the meeting that the old *Description of Durham Cathedral*, mentioned the existence of "pewes or carrells," each having a desk for books, in the north walk of the cloister.[*]

Mr. Walcott said the word appeared as *Karollæ*, in a Treasurer's Inventory of St. Paul's of the thirteenth century; though Carter, adopting the spelling in the "Rites of Durham," in his account of Gloucester Cathedral, printed it *Carrell*, which meant fustian cloth. This was certainly a gross mistake. In such matters it was necessary to refer to the original authorities. In conclusion, he thanked the meeting for their kind attention in listening to a long paper.

The meeting was then adjourned to the 12th of January, 1863.

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[*] This is noticed in the Architectural Publication Society's Dictionary, s. v., which also names the explanations given of the words *carola*, *karola*, *carrol*, or *carrel*, by Ducange, the Oxford Glossary, and the Statutes of the Premonstratensians; to which might have been added the fact, that carrall or carroll windows are mentioned so late as 1533 and 1575, in Bayley's Tower and Jupp's Carpenters. The same article also notices the existence of the carrols in the north side of the south walk of the south or great cloister at Gloucester.—J. W. P.

SUNDRY SANITARY BUILDING APPLIANCES.

By John Taylor, Junior, Esq., M.A., F.S.A.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, January 12, 1863.

I purpose, on the present occasion, to consider some of the defects in our present mode of building, particularly those which cause damp, cold, and unhealthy dwellings; and as I am addressing those whose lives, it may be said, are devoted to the consideration of such matters, I am sure I shall be excused if I bring the subject before them in a somewhat dry and technical manner, feeling confident that if I succeed in pointing out but one useful remedy, I shall not be considered as having needlessly occupied the time and attention of the members of this Institute.

I do not desire to appear as an inventor, having no new or untried material to lay before you. During my practice I have endeavoured to use such materials as we have; and when I have found that their usual application was defective for the required purpose, or too confined, I have contrived a novel adaptation of them, and thus avoided the doubts and difficulties always attending the introduction of any new material, however well adapted it may appear to its purpose. I think our profession is not to be blamed for the extreme caution with which its elder members, at least, adopt anything that is new; nor must we censure them for waiting till success has been proved, by others, to be beyond all doubt. The reason is obvious, when we reflect that the credit due to the success of the novelty goes to the inventor, while the blame for its failure is attributed to the architect.

We are all well aware of the difficulty of constructing dwellings which shall be free from damp. I propose, therefore, to consider how this defect may be remedied, and shall treat this matter under the three following heads:—Firstly, How to keep down ascending wet; Secondly, How to keep out drifting wet; Thirdly, How to shelter from falling wet.

The greatest evils, in a sanitary point of view, are doubtless caused by damp rising up the walls by capillary attraction. Rain, absorbed as it falls from the heavens, is uncomfortable enough; but when it ascends from the lower regions, with its compounds of heterogenous impurities, it is horrible to contemplate the stagnant, impure, and offensive matters which rise up with it, impregnate the walls, and become evaporated in our dwellings, causing discomfort, disease, and perhaps death; while the higher the temperature—that is to say, the apparent warmth and comfort of our rooms—the quicker will be the renewal of the noxious supply. I think these evils are so well described by the editor of the *Builder*, July 5th, 1862, that I am tempted to read an extract:—

"Knowing the damage which is often done to buildings by damp, and the serious danger to health which arises from this cause, it is extraordinary to find in so many instances how little care is taken effectually to drain the ground surrounding dwellings, and otherwise to keep them dry.

"In the metropolitan suburbs, and in many other places, both in town and country, there is especial reason for complaint in this respect. Pools of stagnant water are allowed to collect and remain during the winter months. The land becomes saturated with moisture, which is more or less absorbed by the porous brick walls of the houses, and still further mischief is done by the summer heat distributing the poisonous contents in vapour throughout the surrounding locality. No care is taken in putting in the foundations.

"The injurious effects and great extent of the evil in cottage and other dwellings are generally not sufficiently considered. In hundreds of instances (notwithstanding that large fires are regularly kept burning) the interiors of rooms, even in houses occupied by persons of means and intelligence, are as moist as some caves. The paper peels off the walls, the plaster cracks and falls to pieces, the covers of books become mouldy and have a fusty smell; papers stored in cupboards, prints hanging against the walls, and linen in drawers, if not constantly aired, soon perish.

"In mild dull weather streams of water run down the glass of the windows, and in frosty weather it is covered with icy crystals.

"At times the paintwork seems in a state of violent perspiration. In such houses ironwork, both polished and of other kinds, gets rusty in a few hours; but these and other evils are nothing in comparison with the ill effects produced upon health.

"The cause of the illness, however, is usually looked for in another direction. In many cases the mischief is caused by want of attention to the spouts and pipes, which get stopped or broken, and in rainy weather streams of water fall upon the outer walls and sink into the basement; for in many of the small dwellings which were built a few years ago, and in too many at present, as already mentioned, sufficient attention has not been paid to the foundations and to the means of carrying away the rain water.

"Even if the spouts are in good condition, such is the nature of the building materials and neglect of drainage, that the damp from the earth may be seen to rise to one row of bricks after another to a height of from 10 to 12 feet and upwards, and it is in such situations that many diseases (particularly among young children) are fostered or generated.

"As regards damp houses, it is not always easy for inexperienced persons to detect them, particularly in the summer time. In order to catch a tenant the exterior is smartly done up, the little plot of flowers and plants looks pleasant, and in the inside every room is decked with the sweetest papering. In a short time, however, a change takes place; and, in spite of care, the colours and patterns fade, and give the appearance of half a century's neglect.

"In a house not far from the Regent's Canal, in Islington, not nine months ago the wall papering was renewed, and now it has almost perished,—in one part from the overflow of the spouts; ghastly forms have appeared in other parts; and from the ground the damp has risen up in the way we have endeavoured to illustrate.

"Too much care cannot be taken to prevent the action of damp, and any necessary sum expended for this purpose will, in the end, be a saving.

"Damage is often done by the damp site on which buildings are placed; and yet, at the present time, we could point to new streets where the scavengers are depositing liquid sweepings, masses of decomposing animal and vegetable refuse, and other abominations; and upon this, presently, the walls of houses will be raised, without the slightest arrangement to keep down the moisture or prevent dangerous exhalations.

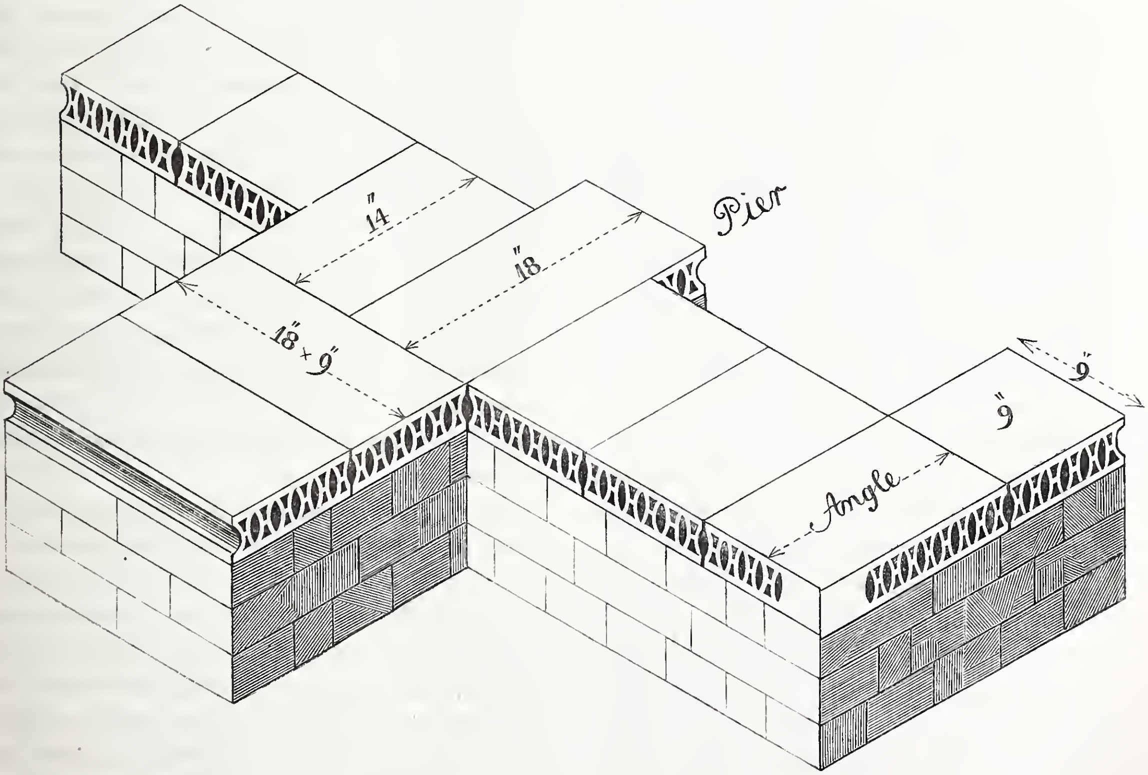
"Those who sleep in the basement of such a house suffer the most."

Our remedies for this have generally been a layer of asphalte throughout the thickness of the walls, "sheets of lead," a course of slates bedded in cement, and sometimes compounds of gas-tar, pitch, sand, &c.; but even when we have used all care in specifying any of these things, how frequently do we find damp still rising, and discover, when too late, that the lead had been stolen, or that the slates had been previously used in a roof and have nail holes in them; that perhaps the clerk of the works was just absent, and a few slates were, by chance, omitted, or they had no lap. But even supposing the desired result to have been effectually secured, we have still to provide for the prevention of dry rot. This is usually done by the introduction of air bricks,—too often inefficient for the purpose; and we should desire that our foundations should be strengthened at the same time, and bonded, say by a layer of rough York stone; but this, in these days of economy, we dare scarcely think of introducing.

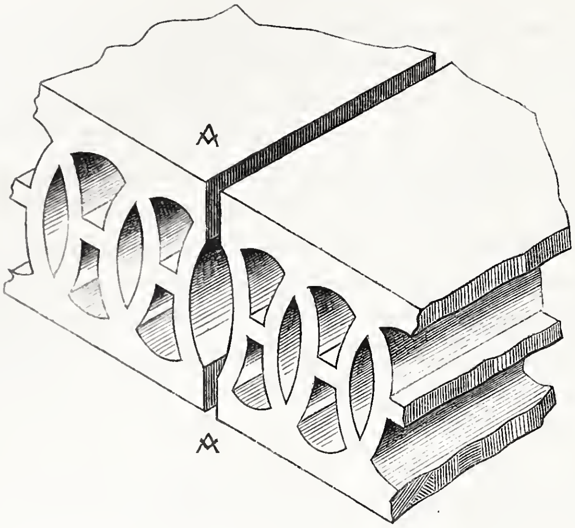
I recollect that when the Victoria Church, in the Isle of Dogs (the church so celebrated as connected with "the Londoners over the border"), was about to be built, I was asked by the architect to visit the spot. I found the soil a deep bog, while the cottages of the poor in the neighbourhood showed fearfully the effect of damp rising up the walls to the height of six or seven feet. The wretched inhabitants, as is too frequently the case, excluded as much air as possible, and so kept up the temperature that the evaporation filled the rooms with foul vapour. The result was ague and fevers; and I think you would discredit me if I stated the quantity of "pitch pills" consumed as a cheap, and therefore, the only available specific. As for the building itself, the frost, acting upon the damp walls, had destroyed the mortar and injured the bricks, and the ruin of the building was evident. In this church my damp-proof course was introduced, and the damp so effectually cut off, that an observer, looking through any part of the walls, at the height of a foot above the ground, could see the traffic on the other side.

This damp-proof course which effects the sanitary reforms to which I have alluded, is a slab (see diagram No. 1), made of a highly-vitrified and non-absorbent material, viz. brown stone ware, perforated throughout its entire width. But even this would be useless for the purpose, if it had not the opening or air space between the vertical joints. This is effected by the hollow, or half air space, on each side of the slab (see A A, diagram No. 2). When these slabs are laid side by side upon the brickwork, they allow the usual mortar-bed below and above them, and yet the joint remains open,

No. 1



No. 2.



with an air space through it, effectually cutting off all damp. Air is admitted through the perforations, and numberless small orifices throughout the entire thickness of all the walls and sleepers, and circulates freely beneath the entire surface of floors and paving. These slabs are 3 inches in thickness, and equal to sustaining 600 feet of vertical brickwork upon each superficial foot. Thus the brickwork is bonded and strengthened, as by a course of York stone. The slabs are made 4½ inches, 9 inches, 14 inches, and 18 inches long, corresponding with the several thicknesses of brickwork, thicker walls only requiring a combination of the foregoing. They are as readily laid, by the ordinary bricklayer, as bricks; and, when compared with asphalte or slates, &c., it must be borne in mind that the building has been raised or constructed 3 inches in height. Their thickness corresponds with the thickness of a course of bricks, and allows the necessary jumps to be made in the brickwork, according to the difference in the level of the surface of the ground, without interfering with the bond.

I think that if I were the intending purchaser of a dwelling, I should much prefer *seeing* the damp-proof course, above which neither damp can rise nor frost injure, in the form of an ornamental string round the building, to exercising my faith in the assertions of the builder that there was a course of slates *somewhere* in the building to keep down the damp.

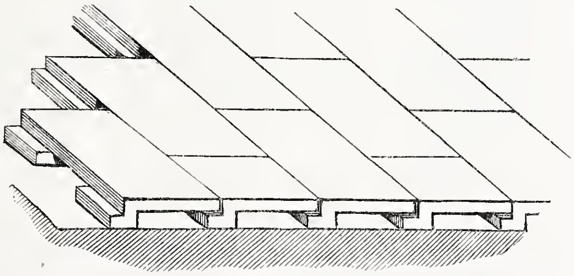
Perhaps there is no more useful application of the damp-proof course than in remedying damp in existing buildings. I have just successfully applied it in a residence for Mr. Bevan. The house is on a clay soil, with concrete beneath the walls, which acted as a honeycomb sponge, in which the water from the clay was retained until it was sucked up the walls, and the house was such as we should not wish even a labourer to live in. Elegant decorations and finishings were about to be done; but the owner consented, at the expense of these, to remedy the defect. A course of brickwork was cut out in a position just above the ground line, and beneath the floor joists and plates, in lengths of about a yard at a time, and the slabs inserted side by side, and pinned up with cement. The dry rot, which had once required all the timbers to be renewed, and was now again destroying them, will be prevented by the circulation of air, and the house will be as free from rising damp as if upon a gravel soil.

Paving.—We have shown how paving in slabs may be kept dry, and have a circulation of air beneath it; but tile paving, as in general use, is laid upon the earth, or some other medium in connection with it, and damp rising causes cold and discomfort. To this is, in a great measure, to be attributed the superiority, in point of healthfulness possessed by a wooden floor; I mean a wooden floor, properly constructed with joists, sleepers, a damp-resisting course, and sufficient space beneath the floor of joists. But how very seldom do we find this; at all events, it is far too expensive for, say a labourer's cottage. We will therefore first consider the paving I propose to employ, with regard to its fitness for this purpose, and we shall afterwards have little or no difficulty in seeing its applicability to other requirements.

In many localities there is a great liking on the part of the labourer, for a floor paved with tiles; and when we visit a country cottage, we are struck with the cleanly and comfortable appearance presented by a well-kept tile floor, and forget its manifold disadvantages. In addition to those just mentioned, we find that if any part of the soil beneath is soft, or varying in solidity, the tile or tiles over it sink slightly and lose their level. This, of course, causes some to be more prominently exposed to wear, and the paving soon becomes more worn in some parts than in others, and its beauty and usefulness are deteriorated.

Bearing this in mind, let us now notice the paving I propose, as represented in the diagram No. 3.

No. 3.



It is formed of tiles, 12 inches by 6, of suitable thickness, each having an under-projecting rib, or flange, which, when laid, forms the bearer of the tile, of which it forms a part, and also a bearer of one edge of the next, leaving a space under the tile for the free circulation of air, which is there introduced through the damp-proof course before described, and allowing the air to circulate, transversely as well as longitudinally, in the spaces under the tiles. Openings are left in the ribs for the air to pass laterally through, from the space under one row of tiles into the space under the next. In the transverse joints are grooves, forming a key for the mortar, which then acts as a tongue, and prevents the air rising up through the joints.

In commencing the laying down of a pavement, a row of tiles is used having an additional under rib, and in finishing the pavement, one with an under rib without the projecting flange. In the commencing and finishing tiles, there are more numerous perforations for the admission of the external air than there are in the general tiles. By these means, air circulates freely under every part of the pavement, insuring its perfect dryness, thus making it, in all respects, a suitable floor for a cottage or other building, and that at a far less expense than any description of wooden floor. Indeed, when we consider that there are no floor joists, sleeper walls, &c., it must be evident that the saving effected is very considerable.

We have seen that in order to lay a floor, it is necessary to make *a general tile*, *a commencing tile*, and *a finishing tile*, and that all have flanges. Hence the question may doubtless arise in your minds whether this must not entail expense. I wish, therefore, to direct your attention to the method of making these tiles. You will perceive that it is expressed through a die, in pairs, and that there are knives or cutters which separate the clay, except where it is requisite to be held together during drying, burning, and carriage to the intended building. The bricklayer, just before it is used, strikes it slightly with a chisel, and it becomes two tiles; thus I find that the risk of carriage is greatly diminished. It should be observed that when it is desired to form the commencing and finishing tile, the same die is used, but one of the cutters is removed to another portion, and thus the commencing and finishing tiles are made in pairs.

I think that this system of paving would be applicable to, and possess many advantages for street paving, and paving for churches, and I am now working out this idea. Models of a street paving, to be made in blue Staffordshire ware, are before you. You will perceive that all the joints are in the sunken parts, and form a part of the pattern, and these, when applied to church paving, and filled in with a cement or composition, will form an effective pattern.

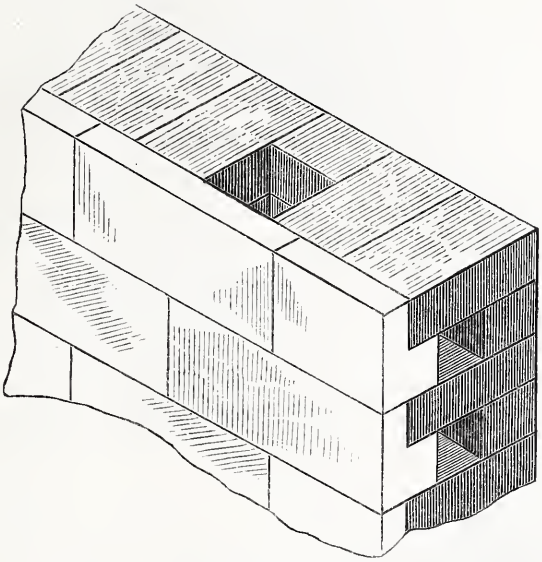
I think I have now exhausted the subject of how to "*keep down rising wet.*" Let us now consider, 2ndly, how to "*keep out drifting wet.*" I think we may consider that our usual mode of construction is with bricks. Our ordinary bricks, it is generally allowed, will absorb nearly a pint of water. Suppose, then, a wall, one brick, or nine inches thick, and that we have a rain of long duration, say sufficient to saturate a good bulk of the bricks, and after this a drying wind, which dries out the external surface. The first subsequent rain renews the absorption, and unless we look to the interior warmth to dry the inner surface, and evaporate it into our rooms, the bricks of our walls remain saturated with moisture. The only remedy for this is a coating of cement, and as this must be periodically painted, those who live in such houses quickly become acquainted with the expense of fulfilling the covenant to paint outside every four years. Consider, also, that every joint in a nine inch wall is a through joint, conveying the moisture into the interior, so that we may readily trace the mortar joints through the inside plastering. In exposed situations by the sea side, the wet blows through the brickwork, and we see the external walls, at Southampton and elsewhere, covered with slates, &c.

Having viewed this subject in a sanitary sense, now look at it in a constructive one. A wall, one brick thick, is capable of sustaining nearly any ordinary weight, but the weakness of the mortar joints causes the wall to yield so much during construction, that it is frequently obliged to be propped up for safety. It is strong enough, but not "stiff enough, owing to the absence of vertical bond." It is strange that we so overlook this, and yet insist upon "horizontal bond." Another defect, in a wall one brick thick, is, that it cannot be worked fair outside and inside.

One of the most general precautions, and perhaps the best, for preventing damp from penetrating the walls, is to build them with a hollow air space, but this is not practicable in a wall nine inches, or one brick thick, except by placing bricks on edge, a procedure which I think very few would approve. Recourse is often had to iron ties and other contrivances, but I think these are not legitimate aids to construction, and do not well answer the object in view. We also see hollow bricks used for this purpose. In my opinion the only advantage they possess is their lightness, certainly a very great recommendation, but they have the same through joint, and their perforations rather harbour the wet than exclude it. Glazed bricks are necessarily very expensive, and a glazed surface is to me objectionable in appearance, except in occasional bands, &c. I think we want a facing brick that shall give a vertical bond, protect or, as it were, intercept the through joints, produce, by its method of bonding, a hollow area within the wall, as near the external face as possible; if in addition it be perforated, we have the advantage of greater lightness.

Facing blocks of this description are shewn on diagram No. 4, they are of an L shape, and bond in with ordinary brickwork; the headers convey the weight on to the flanges or rebates, and the yielding joints of the brickwork are strengthened by the vertical bond thus attained. All external headers are avoided, and the through joints are either intercepted by the facing brick, or by the dry area which is formed by those bricks between them and the ordinary brickwork. It will be seen that a much smaller proportion of these facing bricks is required to face a wall than hitherto, all headers being unnecessary, and the bricks made of the superior clays of Suffolk, Southampton, Poole, and elsewhere, can be sent a considerable distance without such a cost for carriage as would interfere with economy. I have used these bricks or facing blocks, and have found them so stiffen the wall, that I have built houses three stories high, the walls of which have not been thicker than those shewn on the diagram. This was done where expense was not an object, but it produced a *dry and stiff wall,* whose lightness was a great advantage as regards foundations, &c.

No. 4.



During a lengthened and extensive use I have never met with the slightest failure that could be traced to their employment, and so completely have the buildings been protected from damp, that I have frequently been informed of instances of a continued overflow of rain water pipes, without any indication inside the building; the walls also became so quickly dry after their erection, that papering could with safety be immediately begun.

The following extract from a letter, received from an occupier of a house, built in this method, will confirm the foregoing observations.

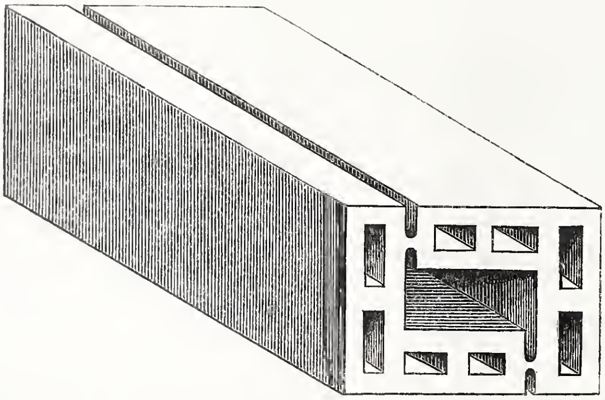
"Everyone who has seen my house admits its very handsome appearance, but its value is far beyond its mere look; it makes the entire wall more substantial, is quite impervious to rain or damp from the moment of its erection, and we all find that the house is warmer in consequence. In proof of its protection from damp externally, I need only mention that some well built brick houses, erected at the same time with mine, and in my immediate neighbourhood, were completed and papered with my own, much of my papering was of a light and delicate pattern, but not a single spot or stain from damp has appeared in my house. The others, I find, have admitted the effects of rain through the new brick walls, and the paper had to be removed and changed."

Another writer says:—"Your blocks, which cover the whole front of my residence, have now been tested for two years, and although the situation and aspect (nearly west) are the most exposed to the driving rains and storms, that side of the house (though a new one) has been remarkably free from damp, as well as much less affected by the changes of temperature; while the back of the house although facing the much drier aspect of the east, and with an equally thick wall, but of ordinary brickwork, has shown evident marks of damp during the winter and wet weather. The colour is also. much admired, and they all remain as firm and compact as the face of the best brick or stonework I only regret that the other side of my house were not also faced with them; and I think them a most valuable invention for so damp and changeable a climate as that of England."

The disadvantages attending them hitherto have been the great risk and difficulty in making and burning them of a large size, the necessary inequality or warping which must be expected in large bricks, and that all being required of a first quality there was no use for seconds. They also required much care in packing and carriage. This did not affect their employment in "first class buildings," but only their general use. I have always found that the larger the brick the more expensive the wall, notwithstanding the opinion often expressed that walls can be built more cheaply of large bricks than of small. I was once of this opinion, but my intimate knowledge of the different processes employed in the brick yards and potteries in this kingdom, has convinced me that the reverse is the case; and only when I find them offered at such a price as will effect this, will I believe that the difficulties and expenses attending their manufacture have been overcome. Till then I will consider it only as an opinion in which I put no faith, and which is opposed to the very nature of the manufacture of brick earth.

The diagram, No. 5, represents a pair of facing blocks I have lately introduced, to fulfil the requirements of general building; the size is 12 inches by 4½ on face; and to prevent warpage in drying and burning, they are made in pairs through a die furnished with knives or cutters, which separates them only enough to enable them to hold together during carriage to the intended works. The bricklayer then readily separates them by a slight blow with a chisel. Damage in carriage is thus avoided, and the costs of manufacture greatly lessened. They are bonded in with the ordinary brick, as represented in the diagram, No. 6. I think, that to build economically, the bulk of the materials employed must be those that are found in the locality. These facing blocks effect this, as their cubical contents are not more than one fourth of the ordinary materials used with them.

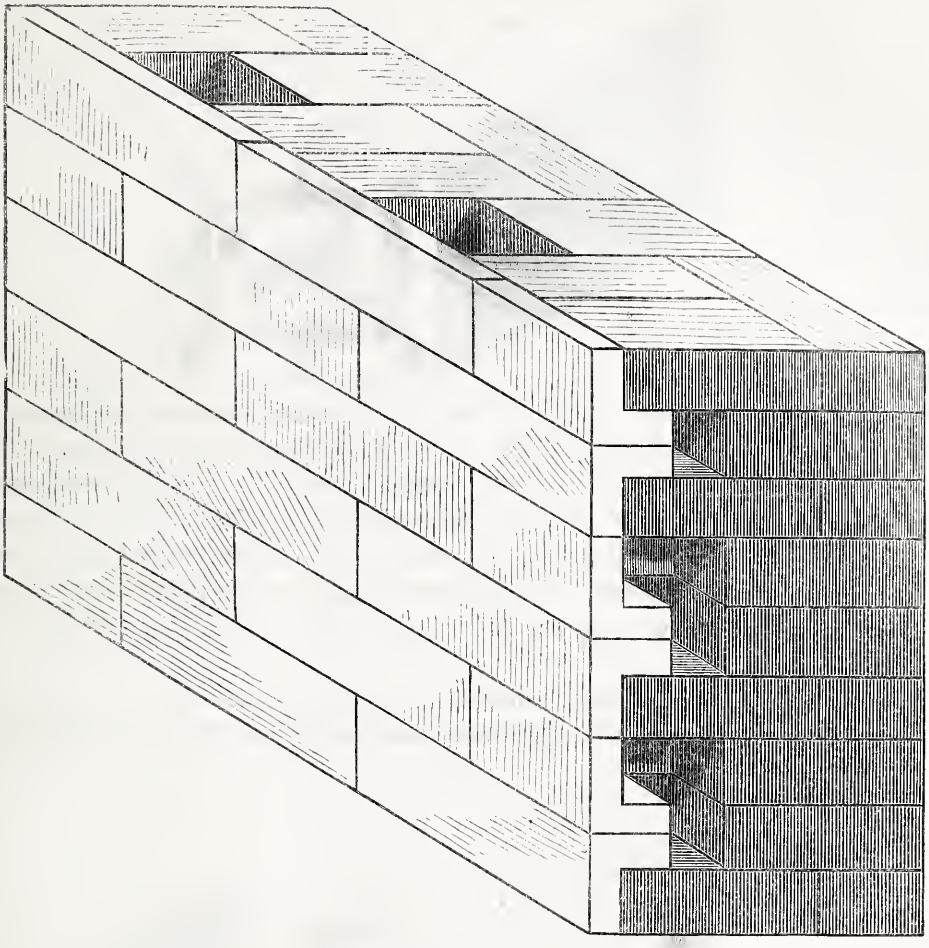
No. 5.



The representation of a cottage wall, 11 inch thick, has less bulk of bricks than a 9 inch wall. The inside is a fair face, not to be obtained in an ordinary wall one brick thick.

I have lately bestowed much attention on the question how to build the cheapest possible wall, a wall that shall be suitable for a labourer's cottage, and I have contrived a brick that shall bond into, and construct with concrete. Perhaps there are no materials that more generally abound, than those with which concrete may be made. This, we all know, is in its proper place, when in the

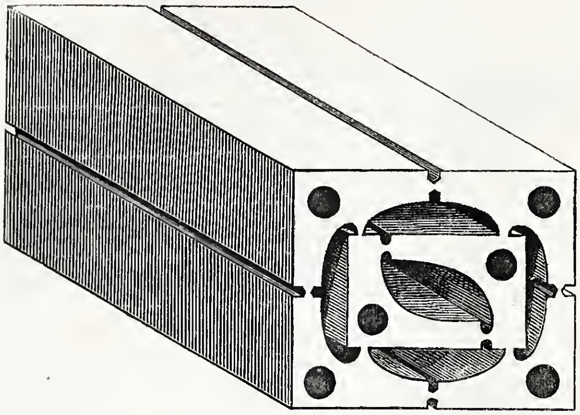
No. 6.



trench of a foundation, and being retained therein, and prevented spreading, it will sustain almost any weight we like to place upon it; if used, however, in forming walls, it is not so retained, and is incapable of enduring cross strain, and when the boards are removed, which were, in fact, the moulds in which the cast had been made, the construction mainly depends upon the adhesive quality of the lime or cement, and not being retained, cross strain and other causes produce cracks and settlement, and the action of the weather upon the surface soon causes premature decay.

The brick for bonding in with concrete, and which faces and retains it, is represented in the diagram, No. 7. It is a hollow block, made by expressing clay through a die. The dark portions are hollow spaces, through which air circulates during the process of drying, and heat readily acts during burning in the kiln. When standing on end they occupy the least possible kiln room; the sectional parts are of a uniform thickness, which favours uniform drying and burning. It has been partially separated by knives or cutters in the die, but is held together firmly enough during drying, burning, and carriage to the intended building. Immediately before use the workman readily separates it into 6 bricks, 9 inches, and 2¾ inches on the face, every one being alike in size, and especially adapted for the reception of concrete. The parts left rough by the fractures caused by their separation form the needful keys for the concrete. The blocks, when passing through the die, have all the beds of the six bricks

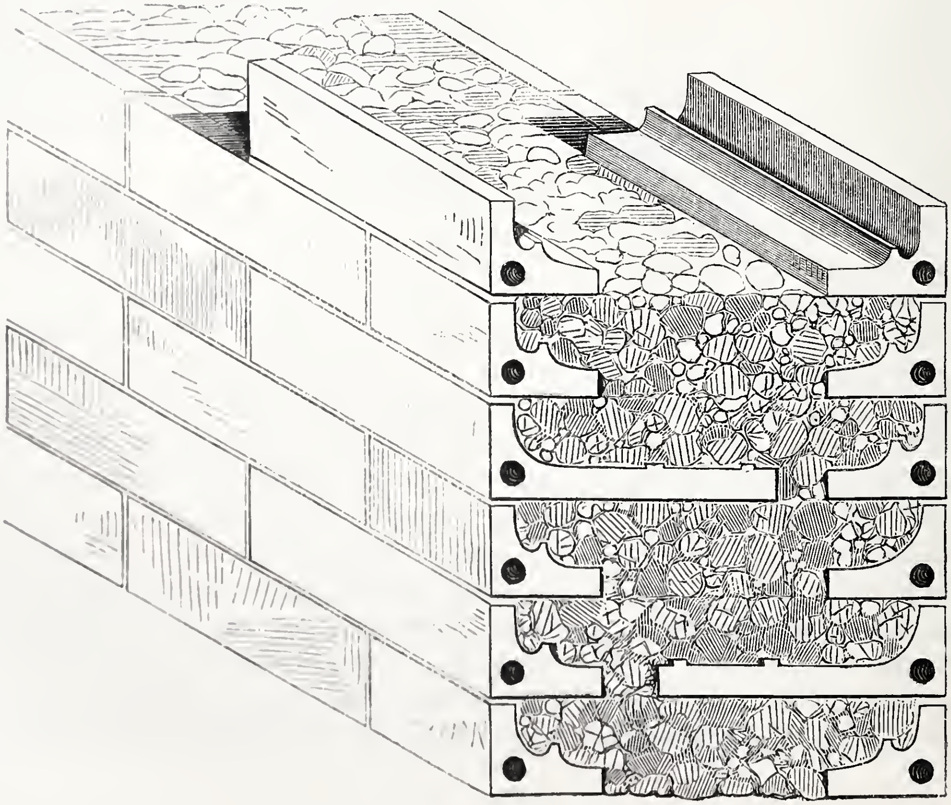
No. 7.



horizontally, and the faces perpendicularly, so that, in this position, the faces are not affected by the air bubbles which generally escape horizontally. I think it will have been seen that, in all the stages of manufacture, six bricks have been produced instead of one, the risks and defects attending the production of a single block, 6 in. by 8 in., and 9 in., overcome, and great economy ensured. Another consideration is, that as they are on the face, the exact size of ordinary bricks, they, therefore, work in, and bond with them, thus avoiding the necessity for angles, reveals, and other special articles. These facing bricks, of best red earth, are £1. 5s. per thousand; their size on the face the same as a stock brick.

In considering their use, suppose it is desired to build an external fence wall, to show a fair face on each side, and that this wall is to be 13 inches thick (see diagram, No. 8), the bricklayer will lay

No. 8.



courses on each side of the intended wall, distant from each other the thickness of it, the labourer then places concrete in the trench thus formed. The vertical pressure is upon the flanges, and this counteracts the outward thrust, thus the concrete is retained as in a trench. The concrete never rises more than a course at a time; this allows of its necessary expansion without injury. The course is thus thoroughly well constructed, and, by this means, a building may be carried up to any height. The facing blocks may also be considered the moulds in which the cast has been made, and these remain, protecting the concrete from decay by the weather, &c. In places where other bonding is necessary, or plates are required, I use the bonding course shown in the wall at intervals. In a wall nine inches thick, with only one external face, a single course only of the bricks is necessary, with the bonders at intervals, and the use of a moveable board inside, during its erection; after this, a little rendering inside with lime, or Scott's cement, which is better, finishes the inside face. I think, if I have shown that concrete may be thus used in building walls, it follows that it is only a useless expense and trouble to form it into imitation bricks, as we have often heard proposed, as this involves first making a cast, and then placing each cast in the wall, the first process being quite unnecessary. A few years ago houses were built upon this plan, but with facing blocks, which were not nearly so well adapted to the purpose. Representations of them are before you; nine months after their erection, additions being desired, openings were made in the side wall, and bressumers inserted, when the work was found to be so strong, that there was the greatest difficulty in cutting the openings, and when an external fence wall was pulled down, slabs four feet long were carried away in barrows to be broken up.

I will now point out how these blocks, in other forms, are used as bands in ordinary brickwork, and the advantages thus obtained; and consider the subject in an ornamental, as well as in a sanitary sense. We must all have been struck with the appearance of brick buildings in London, particularly those faced with white Suffolk bricks, which have turned black after having, for a few years, imbibed the rain, and the London smoke and blacks. Nor can we have failed to remark the damage done to those parts exposed to the action of moisture dripping from window sills, chimney shafts, &c. This would be remedied by good weathering, and to effect this, I employ drip bands of brown stone ware. Perhaps there is no material more impervious to wet, and more durable than brown stone ware. We acknowledge this by requiring it to be used in drainage, where these qualities are essential; but its applicability as a building material to be used externally, seems hitherto to have been quite overlooked, except in such small articles as air-bricks; as also the ornamental effect it is capable of producing. Of this material, in the manufacture of which we so greatly excel, the drip bands are made in a moulded form, projecting sufficiently beyond the face of the building to allow the throat formed upon the under side, to drip the moisture on to the drip band beneath. Thus the face of the building becomes weathered, and the highly vitrified and glazed material receives the wear and tear it is so well adapted to endure. They are made in pairs to be separated at the building, and are laid with little more trouble than bricks. Indents for rain-water pipes, internal and external angles, stopped ends, &c., are made so as to be readily inserted if required. Their colour is a full rich quaint brown; the glazing produces a pleasing play of light and shade, and when they are introduced with a 6 in. white band beneath, in connection with stock bricks, or with a buff band with white bricks, very effective horizontal bands are obtained. Their most recent application may be seen in the stations of the London, Chatham and Dover Railway, at Clapham, Dulwich, Camberwell, &c., and at Walworth Station, now erecting. (See the representations upon the wall). In the elevation of these buildings, no stonework has been used, but arch keys, springers, and voussoirs of terra-cotta, with simple impressed patterns upon them, not in imitation of stone, but as a superior brick construction. The sills are of blue Staffordshire ware, with the brown stone drip beneath. (Samples of these are on the table). I have now in hand a façade for the Blackfriars' Road Station, where rapidity of execution, economy, and a certain effect are desirable. The diagram on the wall indicates the bands, sills, springers, keys, &c., in connection with stock bricks. I introduce this as merely suggestive, having no doubt that many other and better forms will occur to you, and I shall feel most happy to give any information I may be able, for their introduction into any proposed building. I find that with a few plain directions furnished to the contractors, in the form of directions to their workmen (see the Description), very little difficulty on account of novelty is felt, and the reference to the several articles makes it A B C to the workman.

Mr. Scott in his able work, "Gothic Architecture, Secular and Domestic," thus speaks of the disadvantages of ordinary brickwork, as applied to London house fronts:

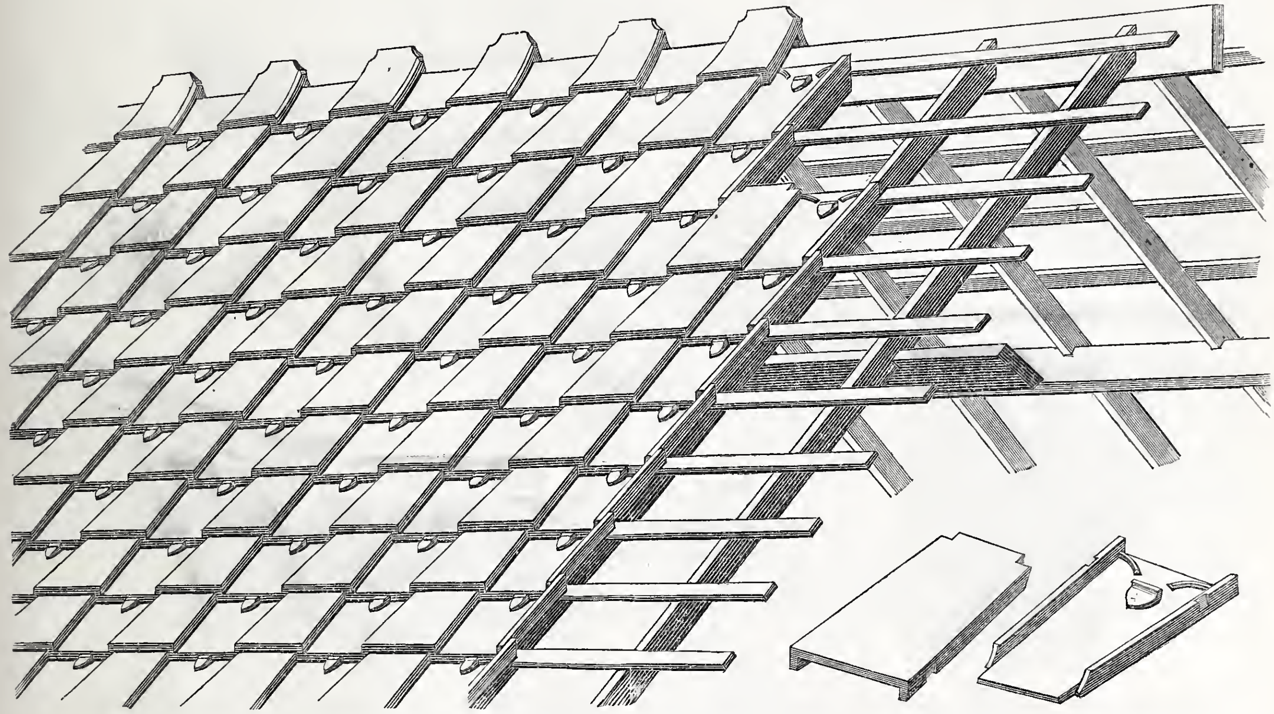
"Ordinary brick will not do for them, its absorbency causes the rapid adhesion of smoke, which penetrates the surface, and renders the whole building a gloomy light-absorbing mass; stone, excepting the hardest kinds, is nearly as bad. This is one cause for the prevalence of cement—we want a cheerful bright material, which will not attract smoke and dirt, and will reflect light instead of absorbing it."

The terra-cotta blocks have a sanded face, as in the sample before you, presenting an appearance of great evenness and beauty. This material, when judiciously used, in combination with brown stone-ware, is capable of producing much effect; and, more especially with brickwork, is far preferable to stone; indeed it seems, by fulfilling very many of the requirements sought for by Mr. Scott, to be a suitable material for London buildings.

We have now arrived at the third part of the subject, viz. "*Protection from descending Wet;*" for instance, the roof covering. I think many will admit that, for this purpose, tiles possess many advantages not to be found in slate, that they are also warmer in winter, and cooler in summer. The drawback to their general use has hitherto been that they must be laid to a steeper pitch than slates, and are much heavier, weighing 1620 lbs. per square, compared with Countess slating at 640 lb. per square. Pantiling is lighter, but only suitable for sheds and such buildings. My tiles, which are before you, may be laid to as flat a pitch as slates, their weight is about the same, say half the weight of ordinary plain tiling.

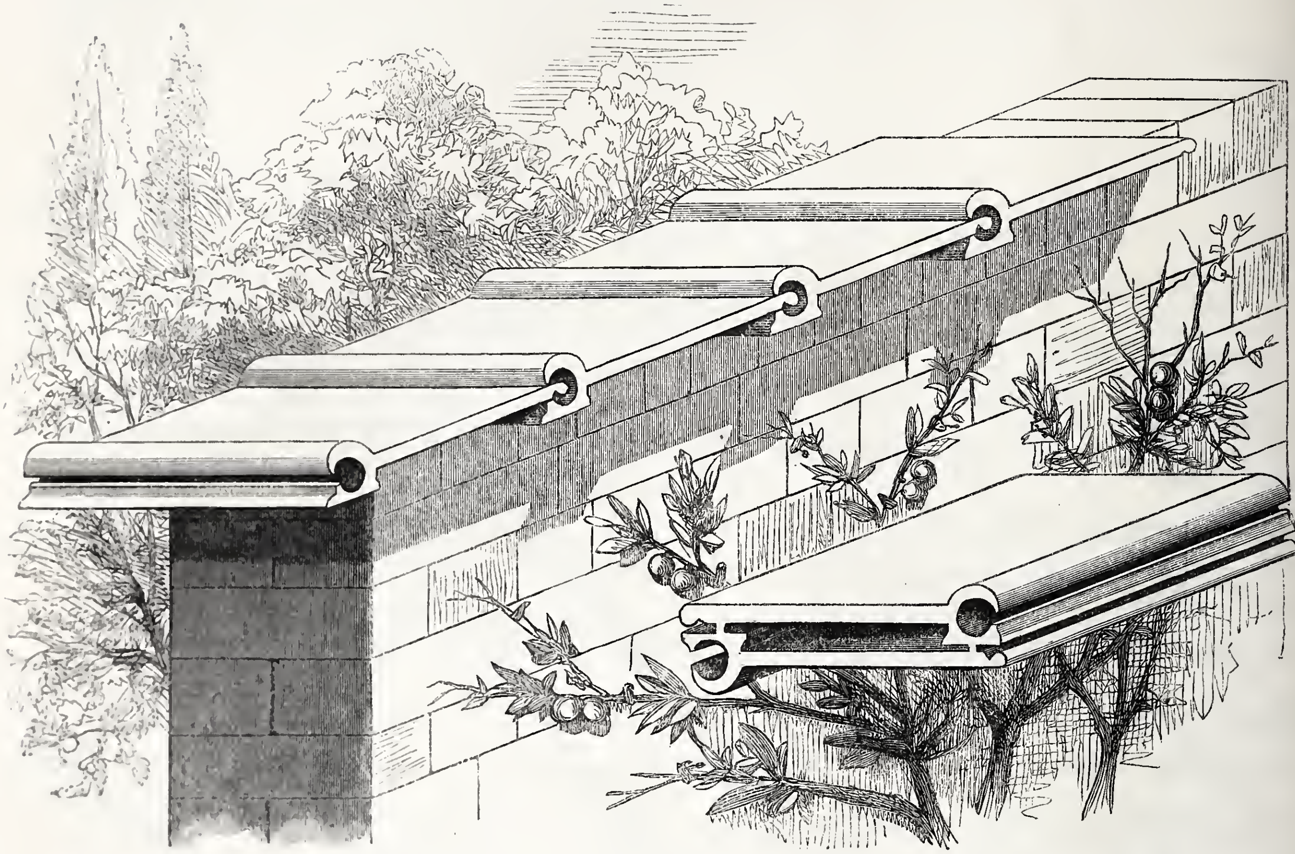
You will observe on the diagram, No. 9, that the tile is wider at one end than at the other, and has flanges at the two sides. The narrow end becomes the lower, which fits into the wider end of the lower or trough tile, the same tile reversed becomes the upper or capping tile. There are notches in the flanges at the narrow end of the tile, allowing the edges of the inverted tiles to descend, so as to bear from end to end on the bottoms of the trough tiles on each side, and thus all the ends of the tiles range in unbroken horizontal lines. There are nibs upon the tiles giving the necessary guage, and securing the tiles one to another. I have found that I may always be subject to having porous tiles made, and a non-porous tile is not so desirable as a porous one, always supposing that the tiles are so laid as to be rain proof. I have therefore recently added the slightly raised and curved ledges just above the nib, the tiles are thus kept a little apart from each other, and any moisture on the under surface of a tile runs on to the upper surface of the tile below it. These ledges and the nib also act as stops to drifting snow, &c. The ridge tile is of a saddle-like (or inverted V) form, of two patterns, each having flanges like the other tiles. When the upper ridge tile is put on to the lower ridge tile, all the joints are lidded or capped. How frequently do we find that ridging becomes defective, that the screw holes which have been filled up with cement, putty, &c., let in the wet, and that other defects occur in this most exposed part. I have therefore made ridges applicable to an ordinary slated or tiled roof, the upper surface of the upper ridge tile being continued down, so as to rest on the flat surface of the roof. The price of these tiles is £5. per thousand, and 186 will cover one square. Thus there is an ornamental and light roof at a reasonable price.

No. 9.



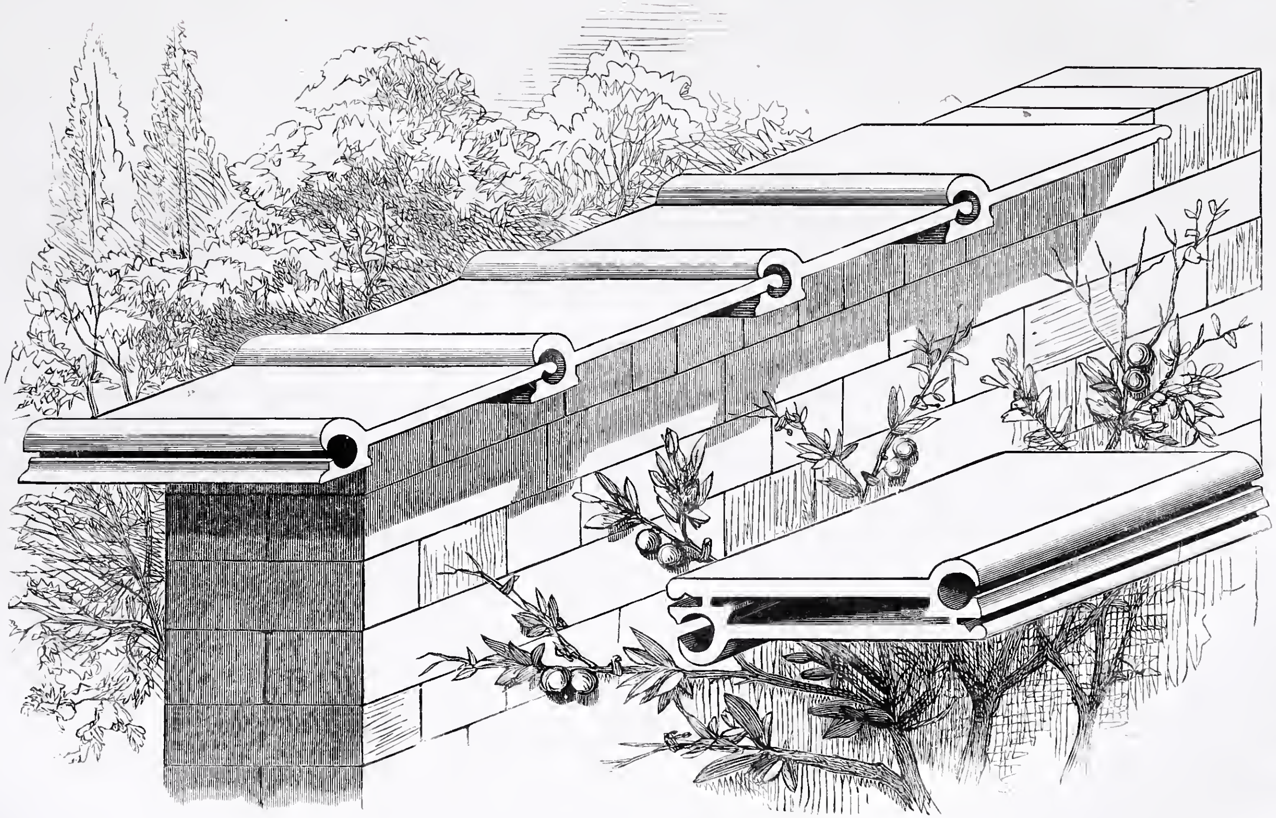
Damage is often done to garden walls by "*wet descending.*" The wall is frequently saturated 3 or 4 feet down—then frost takes effect, the mortar joints are destroyed, and it becomes seriously dilapidated. Fruit-trees growing against such a wall are injured, while a projection of a few inches beyond the face of the wall, would also be a protection against frost. Hence a good capping to effect these objects is much needed. I have contrived a flat capping tile or slab (see diagram No. 10) Its appearance is rather Italian, projecting a few inches beyond the sides of the wall, with bold rolls across the wall at intervals. There are troughs, formed like the letter C along one of the edges of the tile, and when the tiles are laid, the other or plain edge of one, enters the trough on the edge of the next, and the flat surfaces are inclined so as to drain into the troughs. Along the under side of the plain edge of each tile, a throating is formed to prevent the water running back on the under side, and behind this throating is a ridge or projection to prevent the plain edge entering too far into the trough, which it does by coming against the lower external edge of the C trough. The under side of the C trough is also throated at each end to prevent the water running back, and to make it drop down a few inches away from the face of the wall. The tiles, when in their places on the wall, rest thereon only at the under sides of the C formed troughs, the flat portions of the tiles being maintained at a distance from the top of the wall. The tiles may be conveniently fixed to the wall by cement. I prefer to secure the tiles the one to the other by driving in a small wedge of dry wood between the upper part or jaw of each C formed trough, and the upper side of the tile that enters it. These tiles are made in pairs, through a die, and held together till they

No. 10.



reach the intended work, by the parts which when severed assume the necessary forms mentioned. In ordinary copings for walls, made in brick or terra-cotta, when any large copings are desired, I have found very great difficulty in procuring them so made as to appear straight. When fixed on the wall they generally assume the appearance presented by a broken vertebra. To avoid these difficulties in manufacture, I have contrived that the coping should be made of more than one piece in width, generally of three or more, according to the width of the wall. The centre piece is made through a die, nearly circular inside, and of the shape of two centre copings outside. It is held together, during burning, at the sides; this enables it to be burnt as easily and truly as a drain pipe, and when it is separated, the fractured parts form rebates. These, when fixed upon the drip pieces, which are made in a similar manner, protect the joints, and a large bold coping, true in form, and well weathered and throated, is produced. I have now explained, as fully as time would allow, the different methods I have found effectual in excluding damp from buildings; and I think that as members of the profession adopt them, many of the evils hitherto experienced will be mitigated, while I trust that what I have suggested, instead of being incompatible with architectural effect, will rather add to and assist it.

My next subject will be *our open fire-place.* The broad question of warming and ventilating is so closely connected with it, that I shall feel some difficulty in confining myself to the fire-place, without giving a treatise upon warmth and ventilation, for which there is now neither time nor opportunity. An Englishman's love for his fire-place is so deeply rooted, that, even supposing it could be shewn that a close stove possessed greater advantages, I am sure he would most reluctantly relinquish all the comfortable associations with which it is connected, although he is accustomed



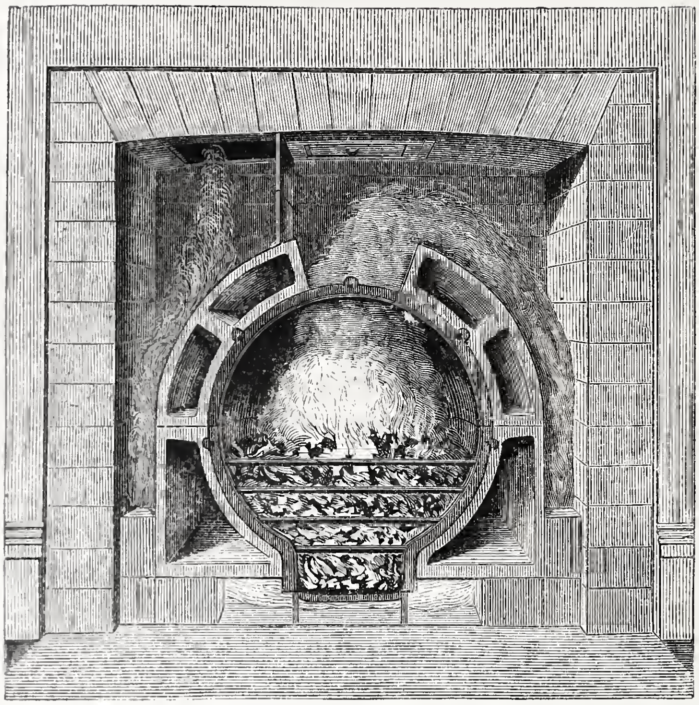
to turn his back upon it (one of the peculiar privileges of our sex). Then there is the amusement it affords, and we are all children in this respect, besides a poker in cold weather is too amusing a toy to be given up. Let me direct your attention to the appearance of our buildings, public and private, all begrimed with soot. Henry the Seventh's Chapel, for instance, the details of which are all but invisible, or the Houses of Parliament so quickly resembling it, in this respect. We need no further examples to convince us that it is almost useless to attempt architectural detail under such circumstances, and that we must rely only upon broad effect. Every mark of the carver's tool increases the evil, and when we carry out such elaborate ornamentation, we seem looking rather to the effect produced during erection, and forgetting how inevitably all will be obliterated, or at least disfigured, nearly as soon as finished. Architects should, for this reason if for no other, be the first to seek a remedy for so lamentable a result of the present manner of consuming coals in open fire-places. I despair of seeing a law passed to compel every inhabitant of this metropolis to consume his smoke, that is to say the fuel in his smoke. The recollection of the old saw that, "an Englishman's house is his castle," must stand in the way, and all we can hope to do is to show how this can be effected without trouble, and how the carbon which is in the smoke, can be passed through the fire and consumed as fuel, instead of hanging over us as a cloud, or falling in showers of carbon, begriming everything. Look at the sky outline of our houses, and see the fantastic cowls, tallboys, and other contrivances, denoting the amount of suffering and annoyance from smoke that must have been endured, before such hideous means were resorted to. Let us but show that by the consumption of smoke these sufferings will be remedied, and the annoyances of the accumulation of soot—visits from sweeps, cold feet, and heated heads—removed, and we shall need no acts of Parliament for the purpose. I think we are all aware that the cause of smoke ascending the chimney is, that the air in the flue is rarefied, otherwise the smoke would as readily go out of the doors, windows, or any other opening. It follows that the absence of the necessary amount of rarefaction is the primary cause of smoky chimneys. Our ordinary fire-places are supplied with the air necessary for combustion, from doors or windows, chinks or crevices, our backs being annoyed by draughts, in proportion to the warmth we are receiving in front. The air also, rushing up the chimney above the fire, reduces the temperature of the flue, not only preventing its use as a ventilating shaft, but rendering it so ineffectual as a smoke flue, that it is soon overpowered by some other fire, and the rooms become filled with smoke. Having thus briefly noticed some of the defects of ordinary grates, I will now endeavour to describe the manner in which my grate removes them, but I must first remark that I lay no claim to novelty in the introduction of fresh air to the fire-place, whether to support combustion, or to be warmed and circulated in the room. This has been already effected in an almost endless variety of methods. Gauger being, I believe, our best guide in this matter, and the inventor of the best system which we have followed.

By referring to the Quarterly Review of December 1854, you will see it described, and recognize therein the principles upon which many of the so-called patent stoves of the present day are constructed. I will read a brief extract:

"The back of the grate and other parts were made hollow, and supplied with air from without passing beneath the hearth, but not by the same channel that supplied the fire, but by a distinct opening. The air traversing the back of the grate became thoroughly warmed before it made its way into the apartment. The supply of hot air was regulated by a valve, so that warm air could be obtained in greater or less quantity, or it could be cut off altogether and cold air admitted in its stead, or the whole supply of cold air might be excluded."

The action of my grate is represented by the diagram No. 11, which shews the front and part of the

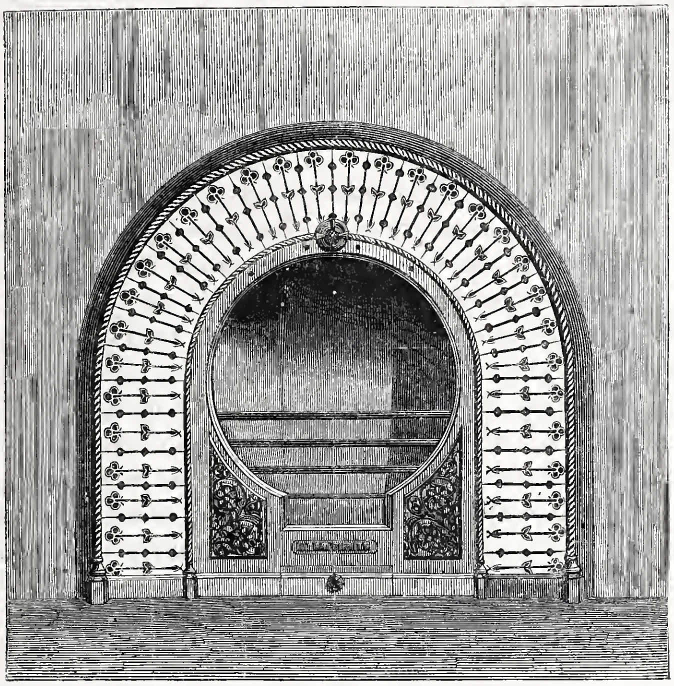
No. 11.



setting removed. The register is closed, either before or after the fire is lighted, the smoke then rises from the fire, and ascends above the stove; but, instead of escaping up the chimney, it descends, and passes over, under, and through the bottom or fire-grate, where there is the greatest heat, and being mixed with the oxygen that plays through the bottom grate, the gases are ignited, and the carbon consumed. The remaining products of combustion then find their way, above the closed register, into the usual smoke flue. *Thus far we see the smoke consumed.* The smoke and heat, which would otherwise have escaped up the chimney, pass down and around the hollow lumps which form the stove. *This effects the desired economy of heat.* External air is introduced, in the usual manner, to the underside of the hearth, and, passing through the lumps, becomes warmed, and enters the room through the perforated tiles, or other perforated media, in front of the lumps, and around the stove. *Thus we have ventilation* by the circulation of a large volume of moderately heated air, with which the room is supplied, instead of cold draughts from door or windows. And the air of the room not being able to rush up the chimney, thus becomes a rarefied shaft, more capable of carrying off the vitiated air from the upper part of the room, than can be done by an ordinary flue. We thus have a rapid circulation of warmed fresh air in the room, and of vitiated air out of it.

The diagram No. 12 represents the front of my grate, which is surrounded, in some instances, with small radiating china tiles, having serrated edges, which, being brought together, form ornamental perforations through which the warm air enters the room, and by this means, the expense and difficulty of making curved and perforated tiles are avoided. These grates are made suitable for the depth of the usual brick chimney, and of various designs, according to the style or other requirements. I have caused some experiments to be made with the anemometer, to test the increased power of the shaft, to carry off the vitiated air from the upper part of the room, and I find that there is an increase of 200 per cent. I think it necessary to remark, that when I first had these grates

No. 12.



manufactured, I thought nothing so good for the purpose as fire-clay or lumps, but I found that air passing over them, and becoming warmed, brought with it a peculiar smell, which, though not hurtful, was unpleasant. I have, therefore, since added iron in such parts as are not liable to be over-heated, and this combination of iron and fire-clay lumps is, at all times, perfectly free from smell. There are simple and ready means of regulating the consumption of fuel, which can be better seen in the stoves before you, than described. I have put them into very smoky chimnies, and have never found them fail to effect a cure.

Church Heating Apparatus.—Your Honorary Secretary, J. P. Seddon, Esq., suggested to me to apply my method of warming and ventilating to churches, and explained the want he had felt of such a system. He furnished me with the plan of a small church, and said it was desirable there should be no stoke-hole beneath the church, and that the apparatus should be as simple and inexpensive as possible. The only shaft at my service was that to the vestry. The plan I adopted is that shewn in the diagram upon the table. The apparatus consists of a small furnace, 2 ft. 6 in. wide, 3 ft. deep, 2 ft. 6 in. high, placed at a depth of 3 feet beneath the paving. This furnace is accessible by a perforated, cast-iron, hinged flap. To the front of this furnace, fresh air is conducted, and the supply regulated, by a valve. In connection with the furnace are two tiers of fire-clay, or terra cotta pipes—the lower one level with the bottom of the furnace, the upper one level with the top. The lower pipe rests upon a brown stone-ware chair, the upper one upon fire-clay chairs, resting upon the lower pipe. These pipes are made with suitable sockets and flanges, fitting securely into each other, and set with fire-clay cement. They run horizontally from the furnace, at the west end of the church, to the east end, where they are connected. They are contained in a brick trunk, covered by perforated iron gratings. Thus far we seem to have nothing differing in principle from the usual old-fashioned brick flues for heating green-houses, except that we have fire-clay pipes instead of brick, and appear to have very rashly laid them horizontally, in which position, such flues to green-houses will not act. Let us now see how the smoke, heat, and products of combustion, are caused to pass, from the furnace at the east end, through the lower tier of pipes to the west end, and return through the upper tier of pipes to the east end, also how the pipes are to be prevented from choking-up with soot. I will here mention that I had never tried to heat a building upon this plan before, and that the result surprised me. You will observe that, near the furnace, there is a communication with the vestry flue, and a valve to open or close it. When the fire is lighted this valve is open, and the smoke ascends the vestry flue, creating a vacuum therein. Immediately after the valve may be closed; the only communication between the furnace and the flue is, then, through the under pipe to the west end of the church, and thence, through the upper return pipe, to the flue. A vacuum having been formed in the flue, as before shewn, and the valve into it closed, the products of combustion rush through the lower pipe to the west end of the church, and returns through the upper pipe, to the vacuum that has been created. It will have been seen that the action is similar to that of my fire-place before described (No. 13). The direct passage into the flue being closed, the smoke and other products of combustion rise from the fuel, and descend beneath and through the bottom grating, where the smoke and gases are consumed: the remaining products of combustion then pass through the tiers of pipes before-mentioned, and when they have parted with their heat, find their way into the flue. I found that the fire-clay pipe, near the flue, was, comparatively, cool, shewing that nearly all the heat was absorbed into the pipes, scarcely any escaping up the chimney; and, knowing how lasting is the heat from a body of fire-clay, the fact will not, I think, be thought surprising, that the church was thoroughly warmed, and the warmth sufficiently lasting to avoid any necessity for renewing the fire during services, &c.

Having successfully accomplished this task, your Honorary Secretary again brought me a plan of a much larger church, and I felt, I must say, somewhat perplexed. I have said that the pipes were comparatively cool near the flue, and it seemed undesirable to increase the size of the furnace, which would have given undue heat at that part, I therefore placed an auxiliary furnace at the west end of the church (represented in diagram on the wall), and substituted corrugated terra cotta pipes, of an increased diameter (those samples before you); I thus obtained a much larger heating surface. This auxiliary furnace was placed as an experiment, as I was not at all certain how it might act. The workmen executed the whole of the apparatus from my diagrams, and when I went to see its action, I must say I was surprised to find that both furnaces were acting as well as the previous single one. I should now have no hesitation in increasing the number of furnaces, and, with other additions which I have in view, I have no doubt of being able to heat buildings of nearly any size, upon this principle.

I have now come to the close of my subject, having occupied your kind attention as far as time will permit, I beg to leave it in your hands, hoping that others, whose experience has led them to detect errors in our present mode of construction, may endeavour to rectify them, and that we may see the result in improved materials, and in the manner of applying them.

[Mr. John Taylor, Jun., wishes it to be known that he will, at any time, be ready to give all further information, at his offices, 53, Parliament Street, W., and will be most happy to receive the directions of Architects, and co-operate with them, as to the intended application of the foregoing materials, &c., into any proposed buildings of importance, rather than attend to the numerous and miscellaneous enquiries that attend their use for general building purposes.]

The President, Mr. Tite, M.P., said, the very interesting paper of Mr. Taylor had occupied so much time, that they could hardly enter upon the discussion of it; and in fact he thought it would be better to adjourn the meeting and spend the remainder of their time in obtaining some additional facts in personal discussion with Mr. Taylor. There was one thing which occurred to him (the Chairman) as a matter of difficulty in the adoption of a good many of these inventions, meritorious as many of them were, the damp-proof course in particular. The facing bricks, for instance, would require to be of distinct measurement, and would require the rooms to be multiples of the same dimensions, and all the walls, &c. at right angles; he apprehended there were also some practical difficulties which builders, by the ordinary methods, would require some time to overcome. His own impression, at the present moment, was that the cost of buildings, on this plan, must be increased. There might be some economy in materials, but in the manipulation of those materials he apprehended some difficulty would be experienced by the workmen. That could no doubt be got over by skilled labour, but they must not build at the railway speed they were doing now. He had seen many contrivances for a better bond, particularly the perpendicular bond which Mr. Taylor referred to, and forty years ago a patent was taken for laying bricks in a certain fashion to obtain a perpendicular bond. Architects attempted to introduce the plan in large buildings, but they found the difficulties interrupted the work so much as to lead them to abandon it. He ventured to say there were these practical difficulties, but he had no doubt, with skilled workmen, a good many of them would be overcome. No doubt a great practical step had been taken in the ascending draught of the stove brought before them this evening. He would now invite, for a few moments, the practical remarks of gentlemen present, thinking it likely that those who were engaged in buildings, who might desire the Italian effects of Mr. Taylor's plans, might elucidate some further points of interest. He would only add that, when he was in Milan lately, he found there were some large manufacturing establishments of terra cotta recently established, and large buildings erected, and he had brought some very beautiful specimens away with him, which he had presented to the Institute. He did not see why they should not succeed with that material as well as their continental neighbours. The Prussians had also done a great deal in ornamental brickwork, which was a material with which their own ancestors, who were skilled in the use of bricks of all sorts, were well acquainted.

Mr. Jennings fully agreed with the Chairman that a difficulty would arise in the adoption of Mr. Taylor's plans on the question of cost. With regard to the damp-proof course, he thought it the best possible invention for the purpose, and much superior to two courses of slates in cement, which is frequently used with the same object. He did not think there would be much practical difficulty with skilled workmen in the employment of most of these materials; he apprehended almost any workman could use the damp-proof course, but where skilled labour was necessary the enhanced cost of buildings, he apprehended, would be a material objection. In his own practice he had been obliged to abandon the damp-proof course, when he found the material, exclusive of labour, cost one shilling per superficial foot. The cost of concrete for walls he found, in most places, exceeded the expense of equal strength in brickwork. With regard to these bricks and tiles, unfortunately they could not be made with the quality of clay which was usually to be met with in this country. The great majority of clays would not answer the purpose; and the conveyance of the materials by railway and carts to the work would add considerably to the expense, and the difficulty of obtaining them for repairs increased the inconvenience of using them. With regard to the facing bricks, there was an example in the side front of the London and County Bank, the effect of which he thought would not induce architects to adopt them. He thought large bricks did not produce a satisfactory effect for the fronts of buildings, owing to their not being perfectly flat; but that did not prevent manufacturers in future producing bricks which would have a good effect. With skilled labour a great deal might be done: and that which Mr. Taylor proposed would be beneficial to the profession generally, as tending to improvements in the manufacture of terra cotta of all kinds. He had, therefore, great pleasure in proposing a vote of thanks to Mr. Taylor for his paper.

Mr. Marrable, Fellow, thought the last speaker had rather "damned with faint praise" Mr. Taylor's plans. All these materials possessed great inventive merit, but as yet very few of them had been sufficiently tested to enable them to say much about them. He had attentively examined them all at Mr. Taylor's office, and he was sufficiently impressed in their favour to determine upon using them in two buildings of considerable extent which he had in hand. With regard to the damp-proof course, he agreed it was the best method of keeping down the damp, and he did not think it would be found so very expensive, although it might cost one shilling per foot sup. for one course of those bricks; the other bricks were saved, and slates were saved, and all the air bricks were likewise saved. Therefore, though there might be a small excess of cost, they had a great advantage over the ordinary method as an equivalent. As to the cost of carriage, he believed the price of one shilling per foot was for it delivered in London; and those whose practice was in London could not have much to say about that. With regard to the facing bricks he did not think Mr. Taylor pretended to say that they were to supersede stone, or produce a surface equal to that of stone. He believed those bricks had been much improved upon of late, and the more recent specimens showed a great superiority over those first produced; and he trusted with experience, and the attention which Mr. Taylor was giving to the manufacture, they would be so improved as to render them a desirable material for general use. He thought the difficulties with regard to the workmen had been exaggerated. He recollected when Portland cement was first introduced, plasterers could hardly be got to use it; they could not get it to stick; it would tumble off. When they got over the difficulty of working plain faces they could not run mouldings; that they said it was impossible to do; but at length they got over that. Then they could not cast ornaments in cement; but he believed they had got over that. He had attempted to use Scott's cement, but had never yet got over the same difficulty with the workmen—he still however believed it to be a good material, but not sufficiently tested. There were many points in the paper into the details of which they could not enter. He had examined the tiles, and thought them very ingenious, and he believed they could be carried with the ordinary care bestowed on common tiles, which were as thin as these, and quite as liable to fracture, and must always be handled with care. He considered these tiles, well laid, would form a most efficient roof. He had no doubt there would be a little difficulty in using these materials at first. The men would, probably, break them frequently, but that was a matter which would soon be overcome. Many of these things, he hoped, would be brought into general use. As far as he had been able to judge, he highly approved of the principles of the stove. Those first produced were defective, but he believed the principle was good; and he had been told by Mr. Taylor, that the manufacture of them had been improved, and that they were now perfectly successful. Mr. Taylor had, evidently, given great time and attention to the details of building, and he hoped his inventions would prove successful; and he thought there would be no complaint, on the ground of increased cost, when they came into more general use. He had great pleasure in seconding the vote of thanks to Mr. Taylor.

Mr. C. F. Hayward, Honorary Secretary, stated that Mr. Taylor's damp-proof course had been used in the erection of a large range of Artillery barracks at Colchester. On enquiring as to its efficiency, he found that, if anything, they were *too* efficient—owing to the great quantity of air admitted—but this could be obviated, perhaps, by stopping up some of the openings with cement; though this would defeat one of the objects of the invention. When employed in every wall of a house, as in the case alluded to, they might admit a great deal too much air under the floors. He did not know whether there was any means of having a damp course of this material without so much perforation. He knew instances, in Essex, where Mr. Taylor's inventions had been used with success.

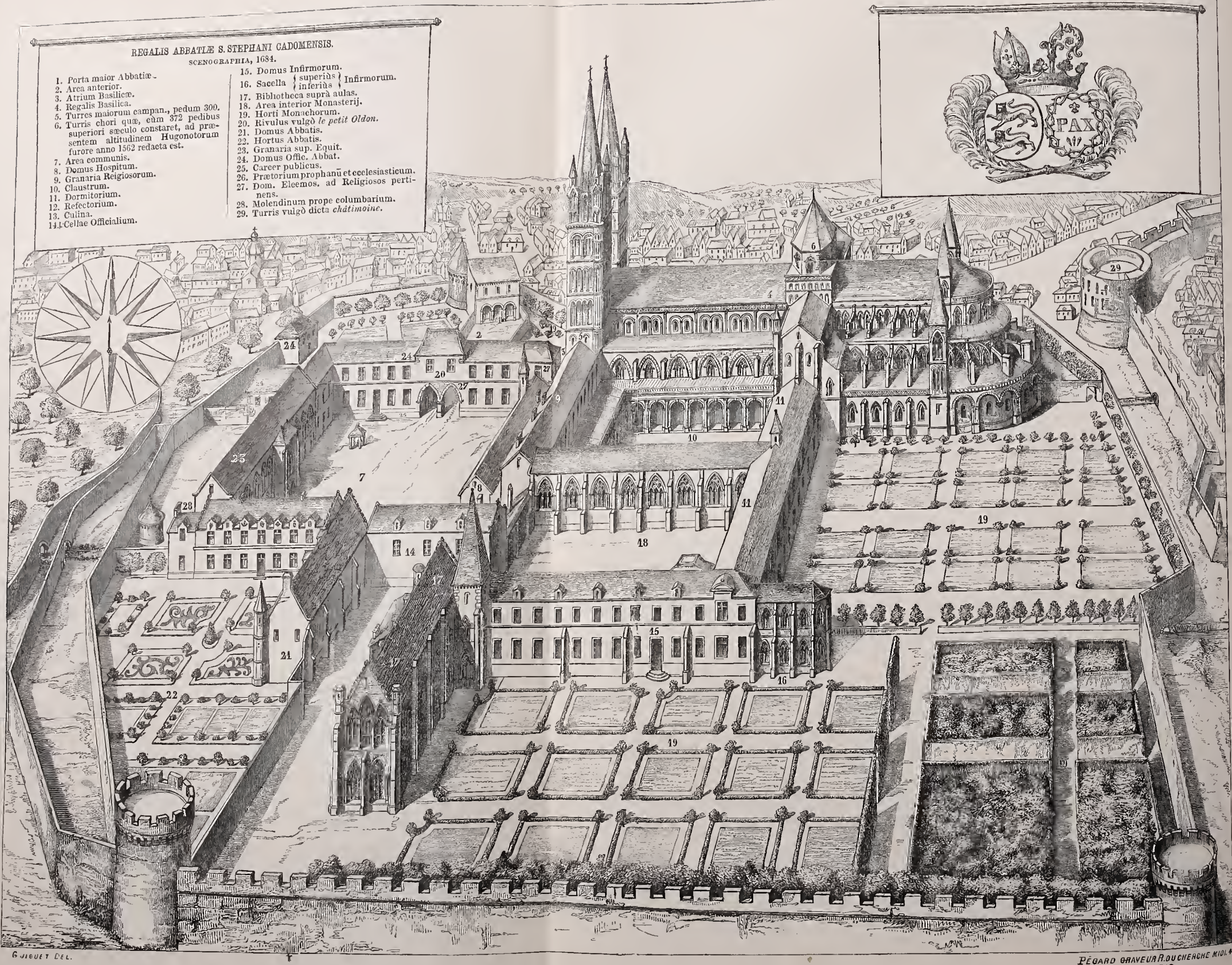
Mr. TAYLOR, in reply upon the discussion, said, Mr. Jennings had assumed the cost of the facing bricks at a shilling per foot super.

Mr. JENNINGS said he referred to the damp-proof course.

Mr. TAYLOR had understood the remark to apply to the facing bricks. The damp-proof course secured the same advantages as were to be found in using a layer of asphalte to prevent damp rising, numerous air bricks to prevent dry rot, and a course of York stone to strengthen and bond. At the same time the building was, by it, executed three inches, or one course of bricks, in height. Perhaps Mr. Jennings had lost sight of these facts when he thought one shilling per foot superficial so high. Mr. Taylor said he would ensure its delivery to buildings in London for 10d. per foot superficial; and it must be worth this, if it were the good thing Mr. Jennings allowed it to be. Then Mr. Jennings had stated that all these things were troublesome, and difficult of execution. If Mr. Jennings had done him the favour to ask him how these things were to be used, he would have furnished him with such simple directions as would have enabled him to build stations, like those on the London, Chatham, and Dover Railway, with railway speed. As to the difficulty of cutting the blocks, he would state that they were made with the same description of clay as the ordinary brick, not found in one locality only, but in twenty, and these being hollow, were cut as readily again as the large brick. Mr. Jennings moreover, evidently, was not aware that the brown stoneware drip-bands were made in random lengths, and it was seldom that the slightest cutting was required. If Mr. Jennings' builders thought it necessary to cut them, they would consume a great deal of time, unnecessarily and expensively, and he believed their tools would be broken before they had cut half-a-dozen. Being fully aware of that fact, and what he considered an advantage, as proving the goodness of the material, he had overcome that which might otherwise be regarded as a practical difficulty. Here (pointing to a model) is an internal angle, which abutting up to, and bonding with the other, the work is done. Supposing it was desired to fix the rain-water pipes against the face of the wall, the projection of the drip band would have to be cut, and perhaps Mr. Jennings's builder had done so; but there was no necessity for such an expensive and needless operation, as there were indents for rain-water pipes, external angles, sloped ends, &c., so that there was not a single article that was not ready to the bricklayer's hand; and with the plain and simple directions for their use furnished to the workmen no difficulty was felt; but without these, that which Mr. Jennings had described would no doubt follow. With regard to the price of these materials, his principal claim was upon the score of economy. Labourers' cottages were built near London, under contract, for £130. each, having three rooms above, and two below, constructed upon this plan; and if the walls were built with the concrete and blocks, there was a saving of £3. per rod as compared with the cost of brickwork. It was therefore quite the reverse of an extra expense; of course concrete would only be used where the materials for it were abundant and cheap. As to the roofing tiles being capable of being made only in certain localities, he would state that they might be made in almost any locality, wherever ordinary tiles could be made. The white tiles were made from Suffolk and Lincolnshire clay, the red materials from Essex clay, and the blue from Staffordshire; and in a country brick yard 80,000 of these tiles were manufactured within the last four months. The specimens of the bricks before them, were made in Lincolnshire, and were sold at 80s. per thousand. They were the size, on the face, of two facing bricks, and there was less work for the bricklayer in laying them, and also the saving in the hollow wall. The bricks for the concrete could be sold for 25s. per thousand. He would not detain the meeting further than to reply to the objections brought forward by Mr. Jennings.

Mr. John P. Seddon, Honorary Secretary, said,—Reference to his name having been made by Mr. Taylor, when speaking of his heating apparatus for churches, he wished to say that he had asked that gentleman to apply his system of consuming smoke to such purpose, from the confidence he felt in his system, as developed in his fire-grates. He had used many of these grates, and considered that their principle was excellent, and thinking that it must prove equally applicable to the heating of churches, Mr. Taylor, at his request, had set about this also, and had, in his opinion, already so far succeeded, that he (Mr. Seddon) intended to employ the same apparatus in other cases.

A vote of thanks having been passed to Mr. Taylor, for his very instructive and practical paper, the Meeting adjourned.



REGALIS ABBATIÆ S. STEPHANI CADOMENSIS.

SCENOGRAPHIA, 1684.

1. Porta maior Abbatiæ.
2. Area anterior.
3. Atrium Basilicæ.
4. Regalis Basilica.
5. Turres maiorum campan., pedum 300.
6. Turris chori quæ, cùm 372 pedibus superiori sæculo constaret, ad præsentem altitudinem Hugonotorum furore anno 1562 redacta est.
7. Area communis.
8. Domus Hospitum.
9. Granaria Reigiosorum.
10. Claustrum.
11. Dormitorium.
12. Refectorium.
13. Culina.
14. Cellae Officialium.
15. Domus Infirmorum.
16. Sacella { superiùs / inferiùs } Infirmorum.
17. Bibliotheca suprà aulas.
18. Area interior Monasterij.
19. Horti Monachorum.
20. Rivulus vulgò *le petit Oldon.*
21. Domus Abbatis.
22. Hortus Abbatis.
23. Granaria sup. Equit.
24. Domus Offic. Abbat.
25. Carcer publicus.
26. Prætorium prophanū et ecclesiasticum.
27. Dom. Eleemos. ad Religiosos pertinens.
28. Molendinum prope columbarium.
29. Turris vulgò dicta *châtimoine.*

G. JIQUET DEL.

PÉGARD GRAVEUR R. DU CHERCHE MIDI, 4
PARIS

ON THE ABBEY CHURCHES AT CAEN.*

By J. H. Parker, Esq. F.S.A. Honorary Member.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, Jan. 26, 1863.

The two great Abbey Churches at Caen have long been considered the starting point for the history of architecture in England, and the connecting link between the architecture of Normandy and England. It has been taken for granted that these churches, as they now stand, are fair examples of the style of building in use in Normandy at the time of the Conquest. A careful examination of these churches shews, however, that this is almost entirely a delusion, which has greatly misled the generality of English historians and amateurs. When we come to examine these churches in detail with the careful observation required by the system of Professor Willis, we find that in the church of St. Stephen in the "Abbaie aux Hommes" there is such a difference of construction in different parts as to mark the work of three distinct periods, all of the style which we call Norman, and all built within a century after the foundation. In the Church of Holy Trinity, in the "Abbaie aux Dames," there is work of two periods now visible, corresponding with the second and third periods in St. Stephen's; there is scarcely anything *visible* of the first period: but during some late repairs, M. Ruprich-Robert, the architect employed by the French Government to superintend the restoration, found some of the small original windows concealed by mortar and partially destroyed by the insertion of modern large square windows. Portions of the early work also remain in the lower part of the towers, mostly concealed by the modern facing of the wall: one shaft with a capital of the eleventh century is still visible, and others are known to exist. It is evident, also, that a change in the work has taken place immediately above the line of the pier-arches of the nave; this was visible even before the late repairs, but was made more distinct by the scraping off the whitewash and plaster. It was a common practice to put a temporary roof over the church as soon as the pier-arches were completed, leaving the upper part, which the French call the *haute église*, to be built afterwards, as funds could be obtained. This is known to have been the case at Amiens, and in Carlisle Cathedral; and, from the architectural evidence, it was evidently done in many other instances. There is often a considerable difference in the details of the upper church from those of the pier-arches and aisles. The name of the upper church (*haute église*), strictly speaking, belongs only to a church of two stories, but it is often conveniently applied to the upper part of a lofty church, especially when that upper part is of a later date by some years than the lower part.

St. Stephen's Church is the more important of the two for our purpose, being better preserved, and affording more distinct evidence of the changes that have been made in the structure. It is notorious that these two abbeys were founded by William the Conqueror and his Queen Matilda, as a penance imposed upon them by the Pope—a condition of their reconciliation to the Church after having been excommunicated on account of their marriage, being cousins, or within the prohibited degree of consanguinity, as is alleged in the charter of foundation of the "Abbaie aux Dames." The late Mr. Stapleton, in the third volume of the Archæological Journal, endeavoured to shew that there was another cause for this besides consanguinity—that Matilda had been previously married to Gerbodo, the *avoué* of St. Bertin, and that the issue of this marriage were Gerbodo, Earl of Chester, Frederic, and Gundrada, wife of William de Warren and foundress of Lewes Priory. He endeavours to shew that the cause of their excommunication was that the Pope had refused to consent to her divorce from her first husband, and consequently that her marriage with William would have been null, if they had not succeeded in making their peace with the Pope.*

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* I have made use of all the books that came to hand which seemed likely to be of any service, including Orderic Vital; the *Vita Lanfranci* in Wharton's *Anglia Sacra; Gallia Christiana; L'Abbaye de Saint-Etienne de Caen*, par C. Hippeau, 1855; the various excellent works of M. de Caumont; the *Memoires* of M. Ruprich-Robert and M. G. Bouet. But, after all, I have relied chiefly on my own personal observations, begun thirty years ago, and many times repeated. The whole truth only dawned upon me by degrees, and my ideas were freely communicated to my French friends: they were at first quite incredulous, but have gradually come round to my way of thinking, or rather, of observing. And although I have permitted them to have the start of me in making the result of these observations known to the public, I must claim the credit of having originated them, as M. Bouet frankly acknowledges. He began his researches at my suggestion, and made the drawings for me, but I am very much indebted to the great care and accuracy of his investigations, and his admirable drawings. Similar observations may be made in nearly al the great churches in Europe; and this mode of observing, for which we are mainly indebted to Professor Willis, offers a very wide and interesting field to all competent archæologists.

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* The marriage of William and Matilda was expressly prohibited by Pope Leo IX., at the Council held at Rheims in 1049, and did not take place until 1053, when that Pope was imprisoned at Rouen, according to the Chronicle of Tours. The charter of William Warren, in the reign of William Rufus, granting the Church of St. Pancras at Lewes to the Abbey of Cluny, contains direct evidence that the wife of William the Conqueror was the mother of his wife, in the following paragraph:—

"Volo quod sciant qui sunt et qui futuri sunt, quod ego Willelmus de Warrenna Surreie comes, donavi et confirmavi Deo et Sancto Petro et abbati et conventui de Cluniaco ecclesiam Sancti Pancratii, que sita est sub castro meo Lewiarum, et eidem Sancto Pancratio et monachis Cluniacensibus, quicumque in ipsa ecclesia Sancti Pancratii Deo serviunt, imperpetuum donavi pro salute anime mee et anime Gundrade uxoris mee et pro anima domini mei Willelmi Regis, qui me in Anglicam terram adduxit et per cujus licentiam monachos venire feci, et qui meam priorem donationem confirmavit, et pro salute *domine mee Matildis Regine, matris uxoris mee*, et pro salute domini mei Willelmi Regiis, filii sui, post cujus adventum in Anglicam terram hanc cartam feci et qui me comitem Surreie fecit, et pro salute omnium heredum meorum et omnium fidelium Christi vivorum et mortuorum, in sustentationem predictorum monachorum Sancti Pancratii, mansionem Falemeram nomine, totum quic quid ibi in domino habui, cum hiba terre, quam Eustachius in Burgemera tenet et ad ipsum mansionem pertinet. Mansionem quoque Carlentonam nomine quam domina mea Matildis Regina dedit Gundrade uxori mee et mihi, et hoc concessit et confirmavit dominus meus rex Willelmus in auxilium ad fundandum novos monachos nostros; totum quod ibi habimus."

"The Chronicle of Tours alone fixes the time of this marriage in the course of the year 1053, but no record has come down to us as to the name of the prelate or priest who, in defiance of the prohibition of the Pope, ventured to perform the ceremony. The Archbishop of Rouen, Malger, uncle of Duke William, boldly launched the thunders of excommunication against the offending parties; and his pretext for so doing has been imputed to the nearness of kindred between the married couple, inasmuch as her grandmother was a daughter of Duke Richard the Second of Normandy, and aunt of William the Conqueror. But it is doubtful if this was the original motive which induced the prohibition, and the peculiarity of the birth of William the Conqueror, as being illegitimate, certainly forbids such a conclusion, coupled with the silence of the Pope at the Council of Rheims. There is, on the contrary, the clearest testimony that Matilda was already a mother, and the long delay between the time of her being sought in marriage by Duke William, when first smitten with her beauty and accomplishments, and the ceremony at Eu, was probably necessary to effect a divorce between Gorbod, her first husband, and his destined bride. In the course of the year 1055, Malger, the archbishop, was deposed from his see in a provincial council at Lisieux; and according to William of Malmesbury, the secret cause of this proceeding was owing to his stedfast opposition to the marriage, rather than to any irregularities of conduct."

For further particulars see Mr. Stapleton's paper in the Archæological Journal, vol. iii., from which these extracts are taken.

There is a singular discrepancy in the authorities as to the date of the marriage. It is said to have taken place in 1048, according to the *Chronica Chronicarum*, part ii. fol. 22. Orderic Vital, tit. 7, does not mention the date of the marriage, but says "that in 1047 William led King Henry into Normandy, and conquered the Duke of Burgundy and the other rebels. Thus being confirmed in his power, he took for wife Matilda, daughter of Baldwin, Count of Flanders." This does not seem to imply any long interval.

M. Hippeau, in his *Histoire de l'Abbaye de Saint-Etienne de Caen*, 8vo. 1855, p. 2, says that the marriage took place in 1053, and that Matilda was then twenty-six years of age. He gives no authority for this statement, but it is most probably correct, as Malger, Archbishop of Rouen, the uncle of William, and who excommunicated him, was expelled from his archbishopric in 1054, and William's vengeance was not likely to have been long delayed. There is, however, a curious mystery about the date of this marriage, and the same as to the age of the two eldest children; even the indefatigable author of the "Annals of England" is only able to say that Robert Courtehose was born *about* 1056, and William Rufus about 1060.

Whatever the motives for the foundation of these two magnificent abbeys may have been, the fact is beyond question that they were founded at the two extremities of the town of Caen, outside the walls, on new sites, where there were either no buildings at all, or at the utmost a small and insignificant chapel. We may therefore conclude that there is no part of the existing buildings earlier than the date of this foundation. It is rather singular that, notwithstanding the notoriety of these foundations, it is difficult to ascertain the exact year in which the buildings were commenced; the authorities differ considerably in the dates both of foundation and of consecration: 1064, 1066, and 1070 are mentioned for the foundation; and 1071, 1073, 1077, and 1078 for the dedication of St. Stephen's.*

Lanfranc was sent to Rome in 1059 to make peace with the Pope, Nicholas II., and returned in 1060 with the pardon and its conditions agreed upon: the foundation, therefore, could not have been before that year; and as Lanfranc was made abbot of St. Stephens in 1066,† it is probable that some of the buildings were then ready, although the consecration of the church did not take place until eleven years afterwards, in 1077. Trinity Church is said to have been consecrated in 1066. Possibly it was not convenient to carry on these two large works at the same time, and Matilda's church may have been finished before William's was commenced; or what is more probable is, that either a temporary wooden church was the one consecrated in 1066, or that only just so much as was necessary for performing the service was then ready, and the altar was consecrated. If this small choir was of stone, it was entirely rebuilt on a larger scale, as at St. Stephen's, the existing choir is clearly work of the twelfth century. The Papal Bull of foundation, granting special privileges to the abbey of St. Stephen, is dated in 1068. The abbey was richly endowed with lands both in Normandy and England.‡ Lanfranc was made Archbishop of Canterbury in 1070, leaving the buildings of his abbey very incomplete, to be carried on by his successors.

My object is to endeavour to shew in what manner this was done, and to ascertain the true architectural history of this remarkable church. To carry on this investigation properly, it is necessary first to examine carefully the existing fabric in all its parts, not merely what is visible at first sight, but to get behind the scenes and examine the real construction; then to endeavour to find what written history is extant, and compare this with the different parts of the fabric, always bearing in mind the customary mode of proceeding in that age in building a large church. It was then always usual to have a regular gang of workmen in the employ of the abbey or other monastic establishment, or of the dean and chapter of a cathedral, or of a nobleman or wealthy landlord of any kind; this custom was universal throughout the Middle Ages, and is still continued in many places. The monks or the canons often assisted in the work, some of them being actual masons or carpenters, and the bishop, the abbot, or the prior was often his own architect. This regular gang of workmen was not numerous, large numbers were taken on upon special occasions only; but a small gang of workmen, as work regularly every day, year after year, produces great effects in the course of time; we know an instance in which only two masons built a country church within one year, and it is evident that five or six men working on steadily together would produce very visible effects in the course of ten or twenty years, even on a large cathedral or abbey church.

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* According to Orderic Vital the foundation of the monastery of St. Stephen's took place in 1064, and the dedication of the church in 1077. But the *Chronicon Goferni* puts the dedication in 1081, and 1086 is given as the date by Innocentius Cironius, *In Notis ad Quintam complutim. Epistolar. Decretal. Honorii III. Pap.*, lib. iii. tit. 20, cap. 51, apud De Moustier, *Neustria Pia*, p. 624. The Chronicle of the abbey itself gives the date of 1073 for the dedication. (*Chronicon S. Stephani Cadomiensis*, ap. Du Chesne, *Scriptores Normanni*, p. 1017).

† Orderic Vital, lib. iii. tom. 2, p. 126, edit. A. Le Prevost.

‡ The following manors, &c., in England were given by the Conqueror to St. Stephen's Abbey, Caen:—Northam, Devon; Frampton and Bincombe, Dorset; Cosham, Wilts.; Wells, Norfolk; Morton and Panfield, Essex; and a house in London, with the land belonging to it. On each of these manors there was, of course, a manor-house or grange occupied by a few of the monks for the abbey, and called a priory; these were afterwards forfeited as alien priories.

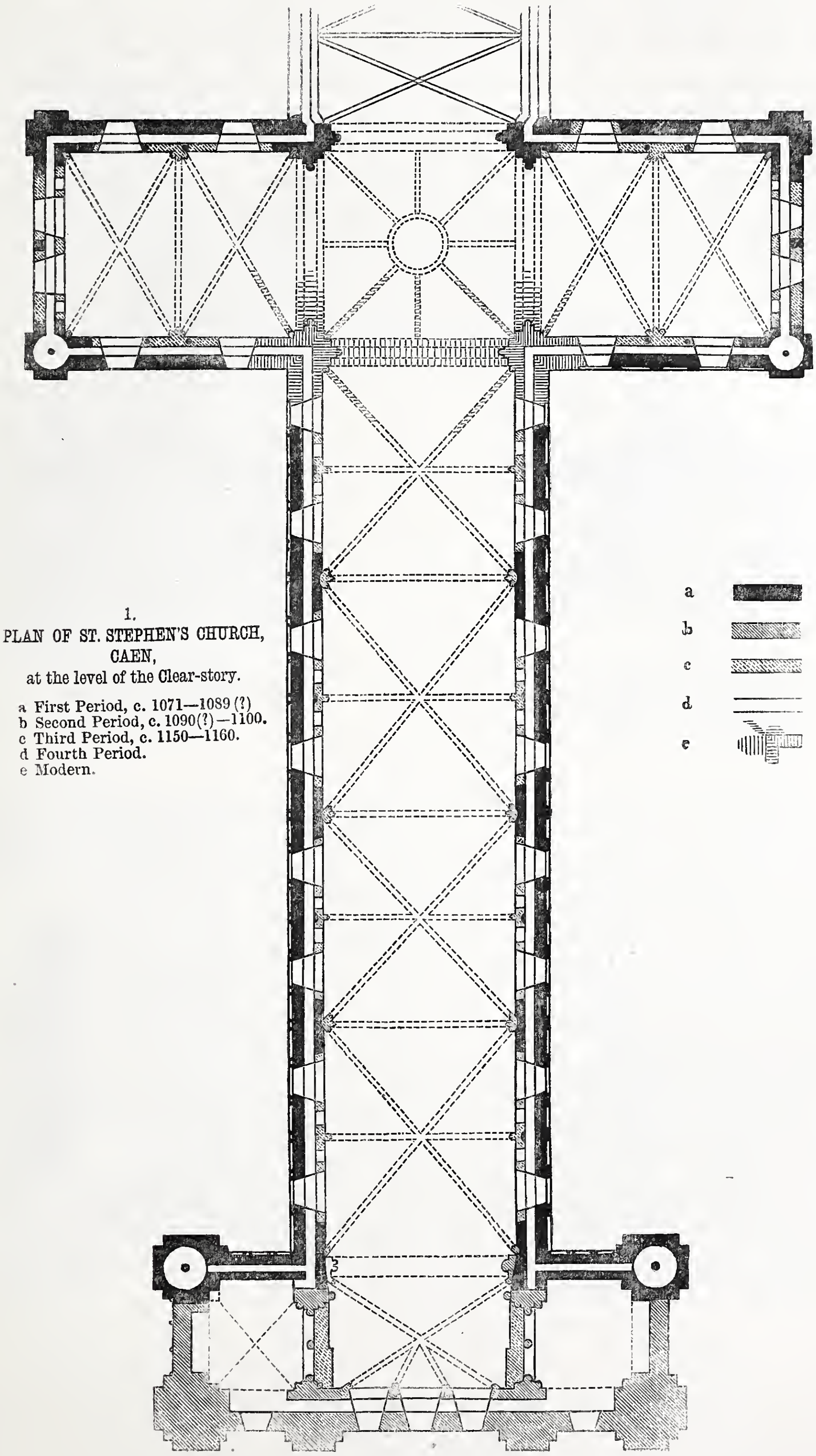
This slow and gradual process, however, renders the work liable to continual changes of fashion during its progress; and this is just what we find in all our large churches, the style has entirely altered during the progress of the work, and before the whole was finished it was often found necessary to rebuild the part which was built first. This gradual progress also makes it difficult to draw a definite line anywhere, and say where one style ceases and another begins. Still, the change between the early parts and the later ones is very manifest, although when it is a continuation of the same design, and all will be visible together, a general uniformity is often preserved after the style has changed in other parts.

Another important point to consider is the usual mode of proceeding,—which part of the church was built first, and what order was usually followed. A comparison of many examples shews clearly that the choir, the part immediately required for Divine Service, was always the first part to be built, and this was finished before any other part was begun; this was the *ecclesia* proper, and was consecrated as soon as it was ready for use, without waiting for any other part of the church to be finished. The next part to be built was one of the western towers, to contain the bells; and the lower part of the west front and of the other west tower were commonly built at the same time. Simultaneously with this, or nearly so, the central tower, or lantern, was built; and to support this, the two transepts, and the two eastern bays of the nave; the intermediate part of the nave was often left till long afterwards, and sometimes not built at all, as at Cologne. The nave was also called the vestibule, and was not considered part of the *ecclesia* in strictness; in Cathedrals it was largely used for secular purposes, as has been shewn by M. Viollet-le-Duc in his admirable *Dictionnaire de l'Architecture*. It very commonly happened that the choir was rebuilt about a century after it was first built, in order to make it more consistent with the rest of the church, and also for the purpose of enlarging it.

These general remarks apply in nearly every respect to the church of St. Stephen at Caen. The first part built was the choir, consecrated in 1073; the other three dates of consecration probably apply to other altars; two, as usual, in the transepts, the third date may very likely be an error of the scribe.

This choir was entirely rebuilt in the thirteenth and fourteenth centuries on a larger scale, and we have now scarcely a vestige of the original small choir, or *ecclesia*, of 1073. The earliest parts now remaining are the east wall of the central tower, the outer walls of the transepts and of the nave, with the original west front, which forms the back of the present western towers, as shewn in the annexed plan, on the level of the clear-story. These parts were probably built between 1073, when the original choir was finished, and the conclusion of the reign of William I., in 1087; and they do, in fact, comprise the main structure of the present nave and transepts, but so much disguised and altered in appearance by the insertion of the vault, that considerable care is required to distinguish the original parts. The central tower, or lantern, fell down in 1566, leaving the eastern wall only standing; the western side was rebuilt in 1602, and the two eastern piers of the nave along with it. The two piers in this position are often the oldest part of the church, as at Vezelay, having been preserved like the chancel-arch of many village churches; when the choir was rebuilt in order to carry the roof of the nave, and again when the nave was rebuilt, to carry the

PLATE I.

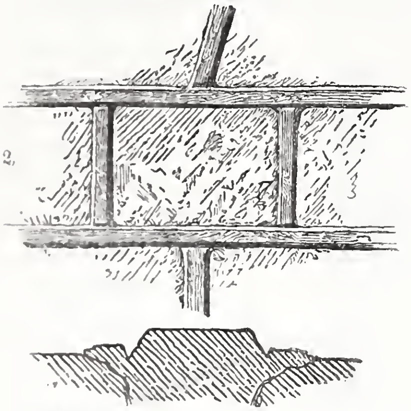


1.
PLAN OF ST. STEPHEN'S CHURCH,
CAEN,
at the level of the Clear-story.

a First Period, c. 1071—1089 (?)
b Second Period, c. 1090(?)—1100.
c Third Period, c. 1150—1160.
d Fourth Period.
e Modern.

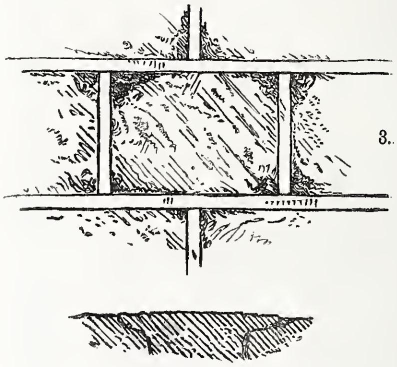
roof of the choir. In the present instance we can derive no assistance from them, and the inner surface of the walls has been entirely disguised when the vault was put on, and the ornamentation of the interior altered in the middle of the twelfth century, and the surface has been deprived of all definite archæological character by the vile and detestable modern French practice of scraping, which has utterly ruined the historical value of many of their finest cathedrals. At Caen this detestable scraping was done in the eighteenth century, but the same vile practice is still commonly continued in other parts of France, to the great disgrace of those French architects who permit it. It is only by going up into the clear-story gallery that we can distinctly trace the character of the original masonry of this first period, and when we do so we find it agree with other masonry of the middle of the eleventh century, such as that in the crypt at Auxerre, in the crypt and apse of St. Stephen at Nevers, and in the refectory of the Confessor's Abbey of Westminster. This masonry at Caen is perhaps the best example of the period, distinguished by the usual wide joints of mortar between the stones, and the projecting and overlapping of the mortar over the edges of the stones: the mortar, from the excellence of the lime with which it was made, has become harder than the stone itself; the surface of the stone also bears the marks of the hatchet with which it was dressed. There is another remarkable feature which we do not remember to have observed elsewhere,—the upright joints between the stones, instead of being made vertical, as in all good masonry, are frequently made sloping, as if the masons were not accustomed to the use of squared stones, but had been used to build of rough stone, which is stronger, and more easily made level, by being built sloping, in the fashion known by the name of herring-bone work, (see woodcut 2). The masonry of the second period has the joints vertical, not so wide, and without the projecting and overlapping mortar, (see woodcut 3). The masonry of the third period has fine joints, such as are usual in buildings of the latter half of the twelfth century, and of the Gothic styles. (See woodcut 4.)

2.



G. BOUET del.

3.



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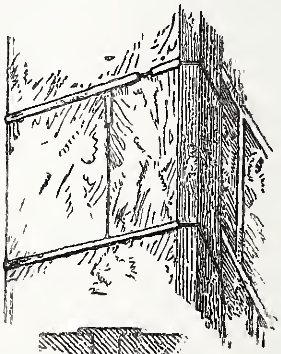
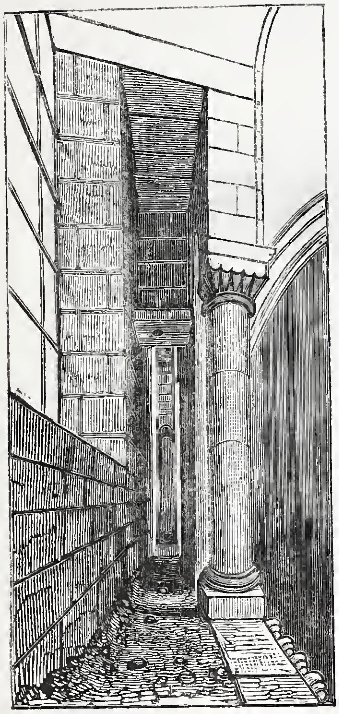
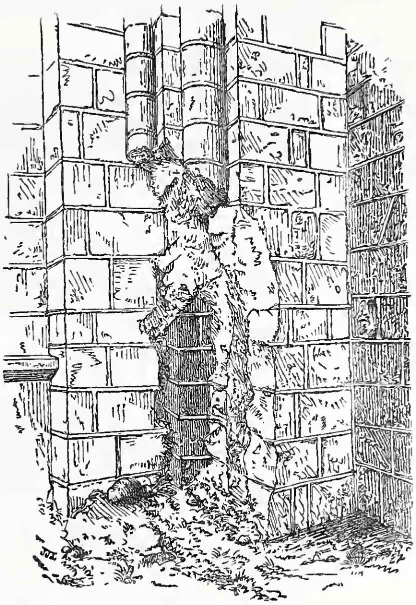




5. Section of the Clear-story, Gallery or Passage.



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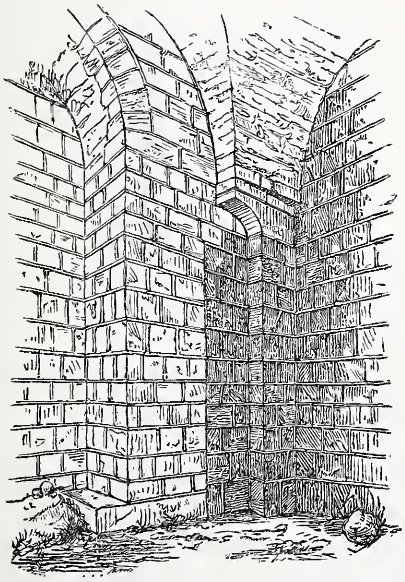
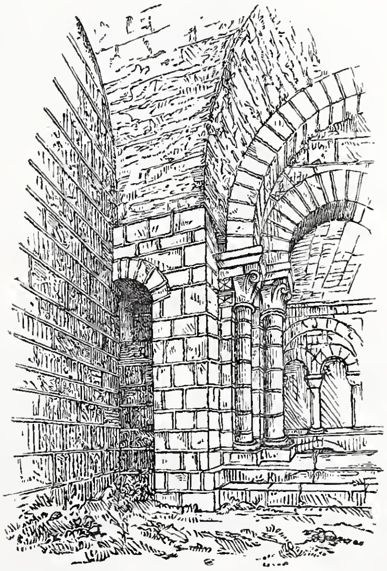
6. Masonry of the First Period, partly concealed by that of the Second Period.



G BOUET. del.

7. Masonry of the First and Second Periods. The dark parts are primitive.

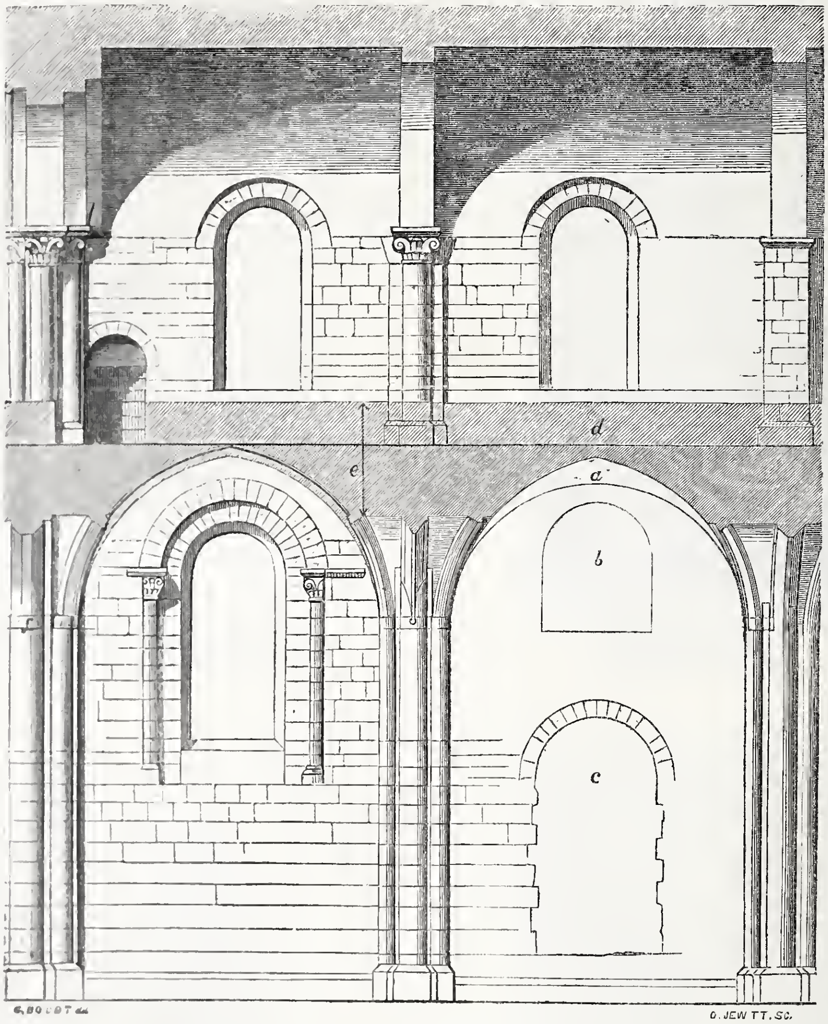


G. BOUET del.

8. Masonry of two Periods and original arrangement.

DETAILS OF THE CLEAR-STORY, ETC., SHEWING THE DIFFERENT KINDS OF MASONRY AND THE OLD ARRANGEMENT.

In the clear-story gallery, and in the chambers of the west front, the masonry of the different periods may be distinctly seen; and the manner in which the early masonry has been cased in later times, with the junctions of the masonry,* tell more of the history of the construction than can be made out in any other manner. (See woodcuts 5, 6, 7).



9. EASTERN BAYS OF NORTH AISLE AND TRIFORIUM.

a Traces of Romanesque Vault (according to M. Bouet).
b Modern Window
c Doorway to the Cloisters (now closed).
d Probable level of the original Triforium gallery.
e Portion hid by the present vault.
f Traces of abacus.

One of these views in the roof of the transept shews also the original arrangement of the clear-story windows, and the top of the arch of the triforium arcade (or blind-story) under it (8), which are quite different from the present arrangement; of this change we shall have more to say when we come to the third period and the vault. The narrow passage through the wall at the level of the clear-story windows, called the clear-story gallery, has been altered in different places, as rendered

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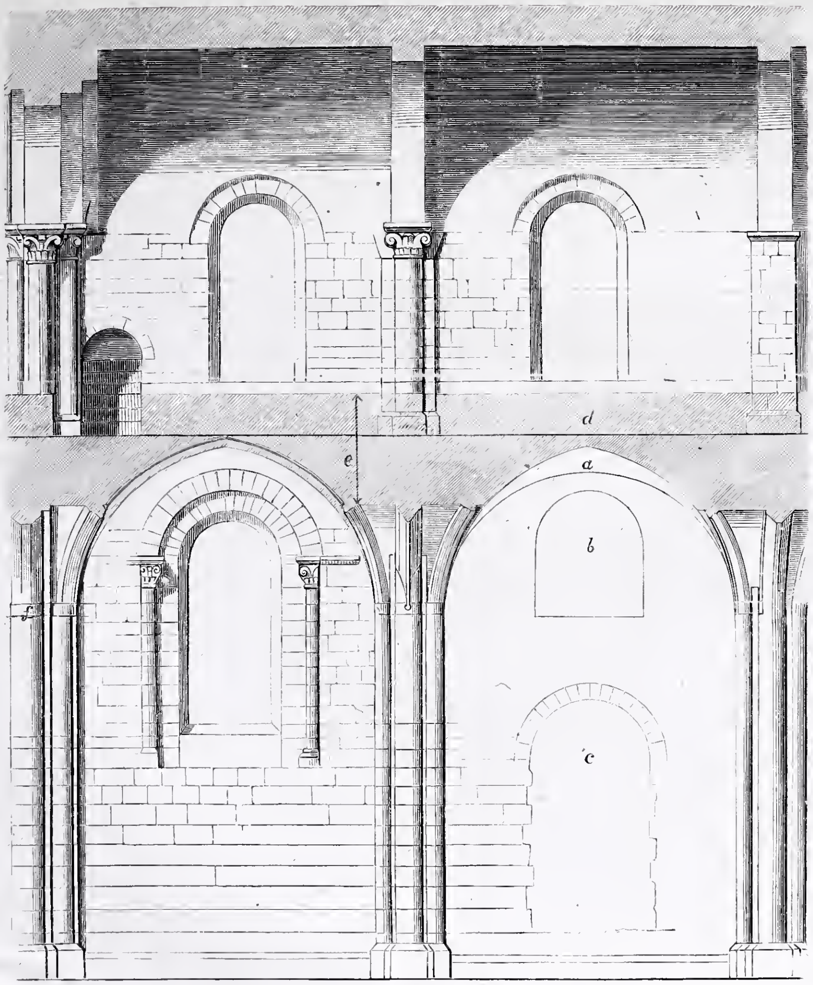
* It should be observed that in those parts which are visible from below, the fine-jointed masonry is made to imitate the wide-jointed, by the overlapping of the mortar; so careful were the builders to attend to the general uniformity of appearance.



d
e
a
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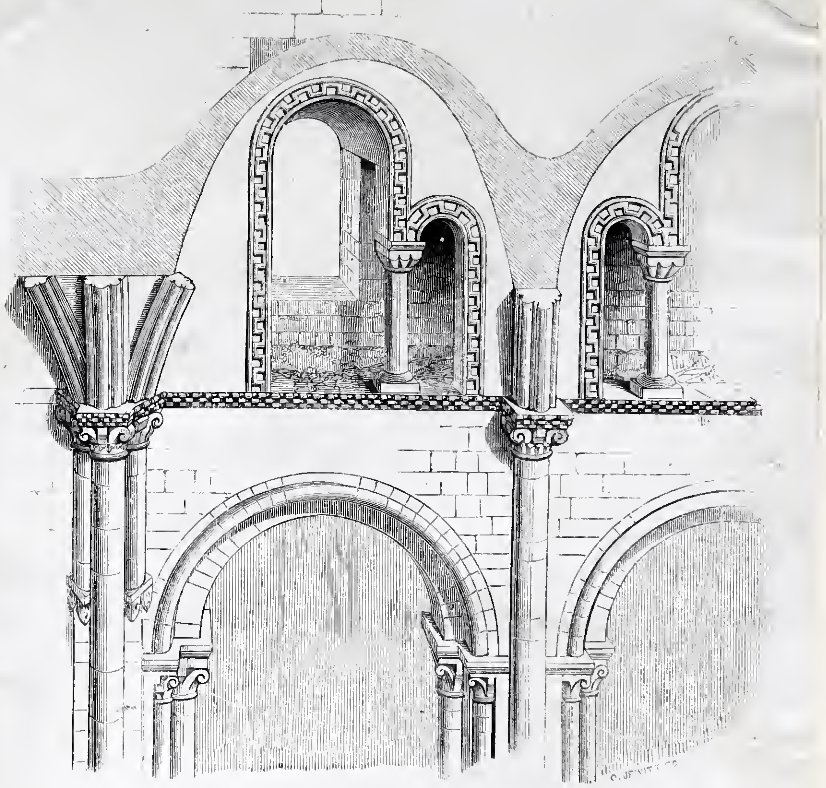
O JEWITT SC.

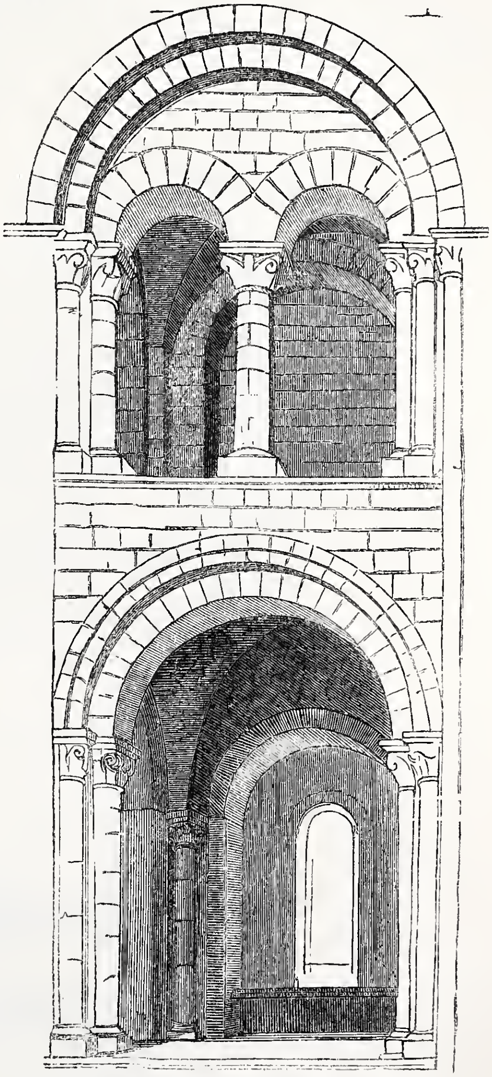


O. JEWITT SC.

necessary by subsequent changes and by the introduction of the great vault; the original parts of this passage are covered by a barrel vault, the later parts by flat masonry only. In the bay of the triforium nearest the transept there is a doorway in the angle below the level of the present floor, and there is hardly room for anything more than a wooden floor between the sill of this doorway, and the top of the arches of the aisles below. The aisles were originally divided from the triforium gallery, or blind-story, by a wooden floor and flat ceiling only, or possibly by transverse vaults over each bay, as at St. Remi, Rheims, and Tournus; the present vault is late Flamboyant, and it is difficult to trace with certainty the original arrangements.

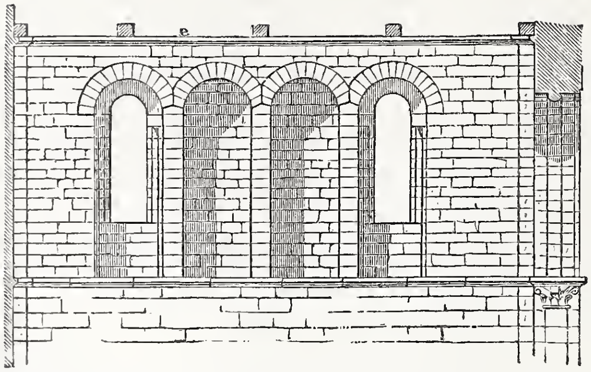
It should be observed that in the few original windows which remain there is no groove for the glass, and they do not appear to have been intended to be glazed.

We are thus enabled to ascertain exactly the original plan and arrangement of this interesting church. More of it is preserved in the transepts than in any other part, as is frequently the case; and we see that these are almost identical with the transepts of Winchester, and other well-known English examples (10). The arches are recessed, but square-edged, and have shafts, the capitals of which are of that peculiar character which marks the latter half of the eleventh century, sometimes called a rude Ionic, and evidently intended for an imitation of Roman capitals, but perhaps rather of the Composite than the Ionic order, as there is always a piece of stone left in the centre between the volutes in the places of the caulicoli: this is sometimes carved, but more frequently left plain especially in the earlier examples. These are probably painted, as at that period the carving and the painting were made to assist each other in giving greater richness of effect to the work than either could do separately.

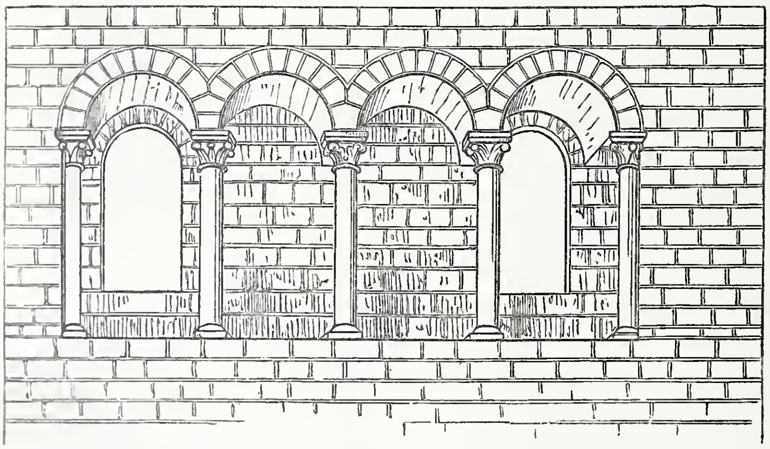


10. One Bay of the West End of the Nave in its original state.

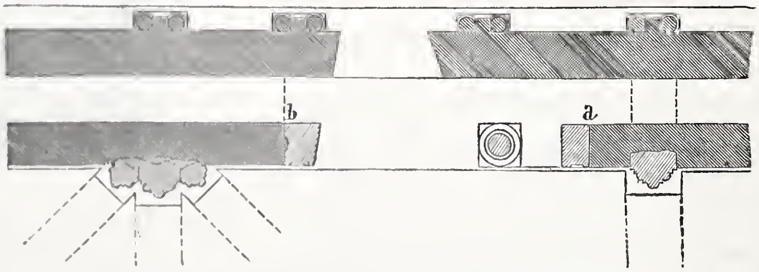
In England we have capitals of this description in the chapel of the White Tower, London, built by Bishop Gundulph, between 1081 and 1090; at Lincoln, in the work of Bishop Remigius, between 1092 and 1100; and at Norwich, in the work of Bishop Losinga, between 1096 and 1110. They became more elongated as they are later in date. This capital may be considered as the second kind of Norman capital in date, the earliest being the cube with the corners rounded off, as in the refectory at Westminster, the probable date of which is between 1066 and 1080, for we know that the choir only was finished when the Confessor died, and the other buildings were completed gradually, as funds permitted. It occurs also in the transepts of Winchester, built by Bishop Walkelyn, between 1079 and 1093; in the crypt of Worcester, built by Bishop Wulstan, between 1081 and 1089; and in all *early* Norman work. The scolloped capital does not come in until the twelfth century, in the time of Henry I.



11. ORIGINAL ARRANGEMENT OF THE CLEAR-STORY OF THE TRANSEPT.



12. ORIGINAL ARRANGEMENT OF THE CLEAR-STORY OF THE NAVE.

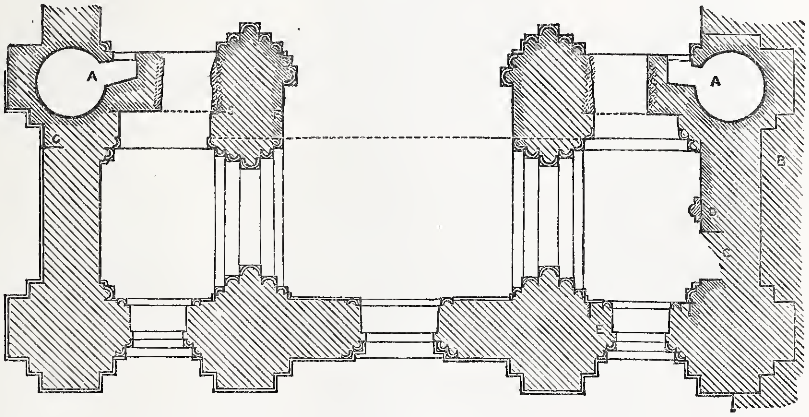


13. PLAN OF PART OF CLEAR-STORY GALLERY.

a and *b* New jambs of the period of the Vault.

The arcade of the triforium, or blind-story, has arches similar to those of the aisles, enclosing two sub-arches; the shafts and capitals are the same as those below. In the bay of the triforium nearest the transept there is a doorway in the angle below the level of the present floor, and there is hardly room for anything more than a wooden floor between the sill of this doorway and the top of the arches of the aisles below. The aisles may, therefore, have been divided from the triforium gallery, or blind-story, by a wooden floor and flat ceiling only, or possibly by transverse vaults over each bay, as at St. Remi, Rheims, and Tournus, or even by groined vaults; and M. Bouet inclines to the latter opinion, though there does not seem to be room for them. The present vault is part of the repairs of 1602, and it is difficult to trace with certainty the original arrangement. The pierced parapet of the triforium gallery is believed to be also part of the repairs and alterations of 1602.

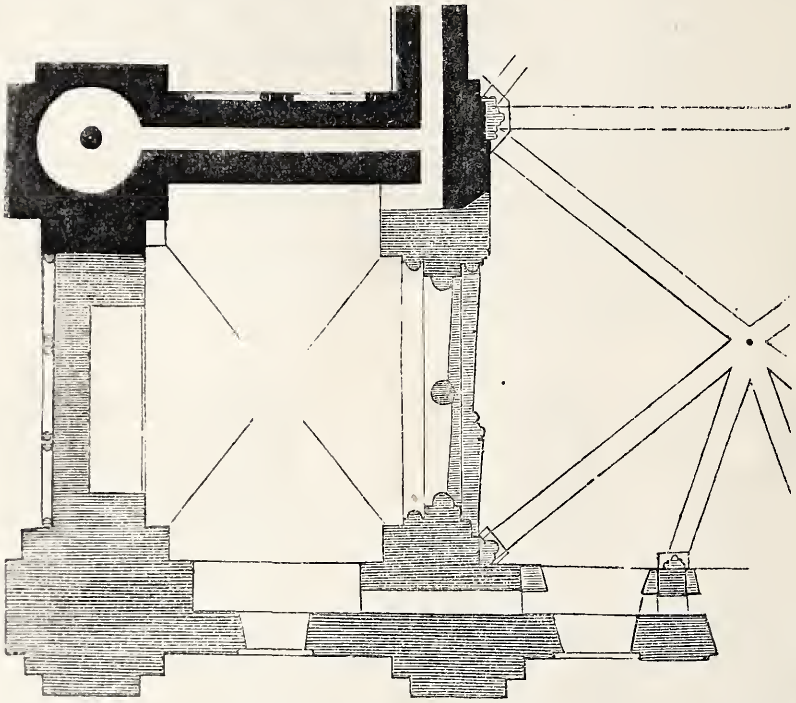
The original arrangement of the clear-story windows and arcade has to be picked out from very slight vestiges, but M. Bouet has succeeded in producing a restoration of it upon paper, which may be fully relied upon. (See woodcuts 11, 12, 13.)



14. GROUND-PLAN OF WEST FRONT AND TOWERS.

A A Stair-turrets.
B Abbey buildings.
C An early doorway stopped up.
D Early masonry with traces of a shaft.
E Doorway inserted in a more lofty one.
F Early masonry, in which the joint is not visible.
G Joint, which continues through three stories to within five feet of the ground.

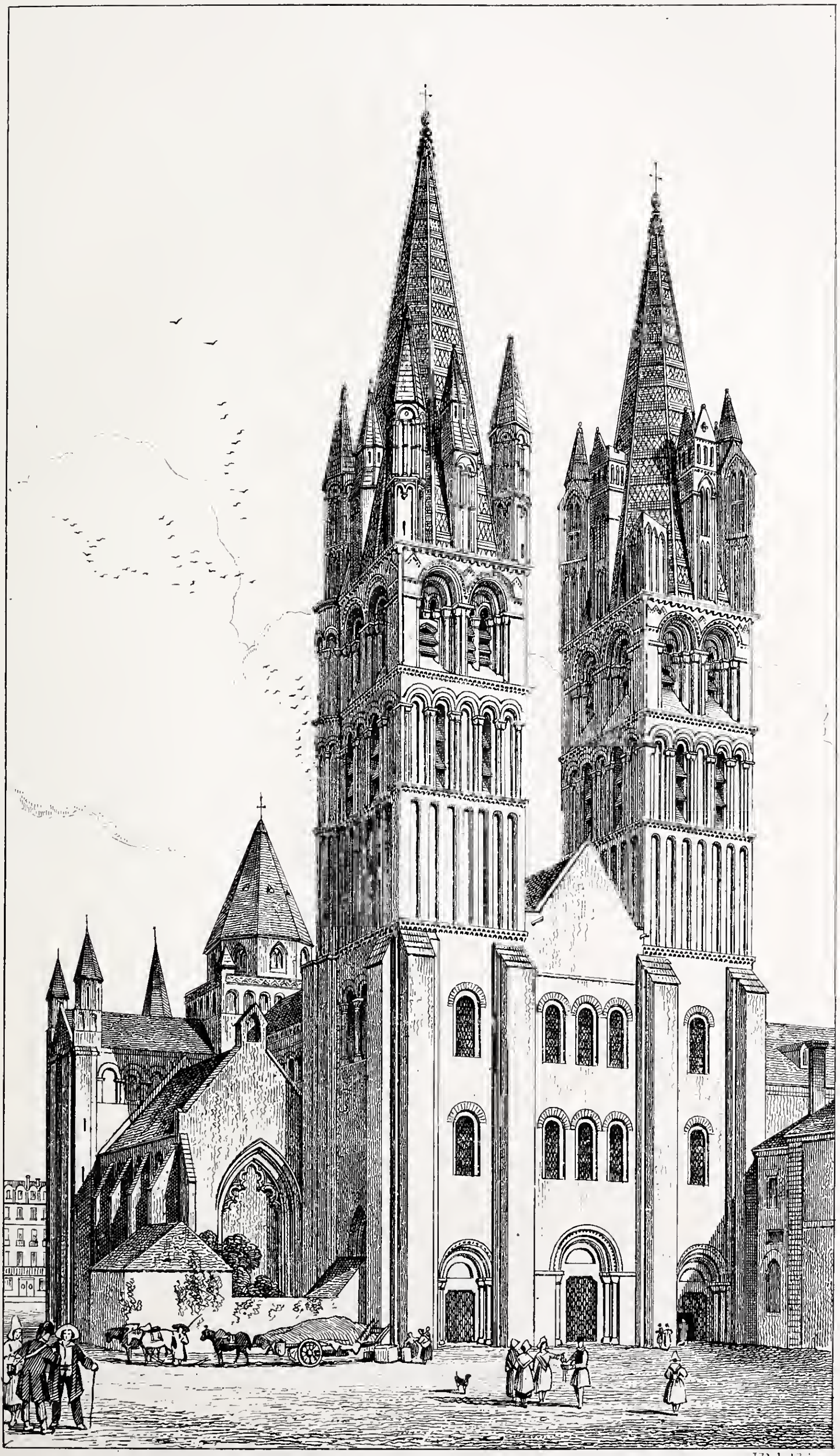
The west front of this church is the part most familiar to English readers by engravings, and has long been considered as the especial type of the Norman style at the time of the Conquest; it now appears clearly, from the close examination of M. Bouet, that it cannot possibly belong to that period, but is the work of the next generation, when the art of building had considerably improved and the masons had become more skilful. The two western towers consist of three sides only, abutting against the original west front, which still exists behind them, and is separated by a straight joint all the way up, as may be distinctly seen on the north side, and still more clearly in the interior; the masonry of the towers and the rest of the present west front belongs to the second period, while that of the original west front belongs to the first period. It appears doubtful whether these towers form part of the original design or not; if they had done so, we should expect that toothing-stones would have been left for them, and we should not have the straight joint from top to bottom. A small portion of the lower part of the south walls does, however, belong to the earlier work, and seems to indicate that a galilee porch was originally intended, but the plan was afterwards altered to the present one, in which there probably was an upper chapel dedicated to St. Michael, as was usual in this situation. In consequence of a change of ritual in the twelfth century, the galilee porch at the west end went out of use, and there are several instances of its being afterwards rebuilt on a different plan, as at St. Remi, Rheims. The views and plans which we are enabled to give of this part of the church shew clearly the change of plan. (See woodcuts 7, 8, 14, 15.)



15. PLAN OF THE NORTH-WEST TOWER, AT THE LEVEL OF THE CLEAR-STORY.

It will be seen at once, on looking at the view of the west front (see Plate), that although the towers belong to the second period, the latter part of the eleventh century, the spires are of the thirteenth. It would seem that a western porch of some kind was always intended; otherwise the west front would have been a mere screen—a wall with stair-turrets at the two sides, with the usual passages and window-openings in the wall. In Italy at a later period such an arrangement might be probable; the celebrated west front of the cathedral of Orvieto, for instance, is a mere sham of this description—a richly ornamented wall to hide the shabby building behind it. But in Normandy, and in the eleventh century, such a plan is not probable. It is, however, perfectly clear that the actual work of this west front belongs to another generation of Norman masons, that is to say, about thirty years after the time of the Conquest; and it follows that, as this is one of the finest churches of the period in Normandy, the building art in Normandy at the time of the Conquest was very little in advance of what it was in England at the same time. The buildings known to be of the time of Edward the Confessor, such as Deerhurst, are somewhat different in style from those of Normandy at the same period, generally smaller and not so lofty, but are rather more richly ornamented than otherwise; The Norman construction is better, but the work is plainer.

Very rapid progress was made in both countries during the century which followed, and by about 1160 the Norman style, more correctly called Anglo-Norman, was brought to perfection, and began to change into the Early Gothic. Plain sunk panels, such as we have in this west front, seem to have been part of the character of the buildings of the latter part of the eleventh century. We find them in Gundulph's work at Malling, and in other instances. Among other reasons for fixing on the reign


J.R.Jobbins

WEST FRONT OF ST STEPHENS CHURCH, CAEN.

of William Rufus for the second period of the work at Caen, besides the comparison with other buildings, may be mentioned that the canons of Waltham complained bitterly of the spoliation of their church by that monarch for the purpose of transmitting the funds and treasures taken from them to the abbeys founded by his father at Caen.* As building was the usual mode of spending money at that period, it is a reasonable inference that some great building operations were going on at Caen, and the monks were hard pressed for money to carry them on, which induced the King to rob the English monasteries for their benefit; and there is no other work in the abbeys at Caen which agrees in style with other buildings known to be of the time of William Rufus, besides this west front, and perhaps part of the nave of Trinity Church in the *Abbaye aux Dames*. Deeply recessed doorways and rich mouldings belong to the third period of the Norman style, and this rich work is far more abundant in England than in Normandy. It occurs also in great richness, and rather frequently in the Angevine and Poitevine provinces in the time of Henry II.

The third period in the architectural history of St. Stephen's at Caen comprises probably the reigns of Stephen and Henry II.: that of Henry I. would belong rather to the second period; but there seems to have been little done at that time, probably from want of funds. During the third period, or about the middle of the twelfth century, the vault was introduced over the nave. On a little examination, it is evidently an insertion within the old walls, but involving an entire change of the decoration of the whole of the interior. The jambs of the windows, with the embattled fret ornament round the edge, are insertions, and have replaced plain early jambs, without ornament; the masonry is not bonded in with the old work. Some of the capitals of these vaulting-shafts are of the twelfth century, of the same age as the vault; others are the old capitals of the eleventh century used again, as was often done. The ribs of the vaulting are clumsily joined to the capitals, and do not seem to fit or belong to them, as is often the case in vaulting of the twelfth century, shewing that the workmen had not yet become accustomed to the mode of working ribs. This is often supposed to be a proof that the ribs are not of the same age as the shell of the vault, but it is really only a proof of clumsy construction, and nothing more. The inner wall of the clear-story gallery has been in great part rebuilt with fine-jointed masonry, for the purpose of carrying the vault more securely, while the whole external wall of the first period remains both above and below the vault. It is evident that the builder of this vault has been much constrained in his plan from some cause, and this cause seems to have been the previous arrangements for carrying the roof. The present vault is sex-partite, each bay of the vaulting comprising two bays of the building, the alternate piers being more massive, as if on purpose to carry a vault of this description; and from this it has been plausibly argued that such a vault must have formed part of the original design, although it was not carried out until long afterwards. But in that case why are the clear-story windows all lobsided? not fitting at all with the present arrangement of the vaults, and having a sub-arch on one side only of each window, instead of on both sides, as usual and natural. M. G. Bouet, of Caen, appears to have been the first person to have fully explained this anomaly. After for a long time maintaining the former theory in spite of strong evidence against it, and after repeatedly examining the construction, he discovered the key to the mystery in the church of the Abbey of Cérisy, near Bayeux, founded by the father of the Conqueror, and building at the same time as the earlier parts of

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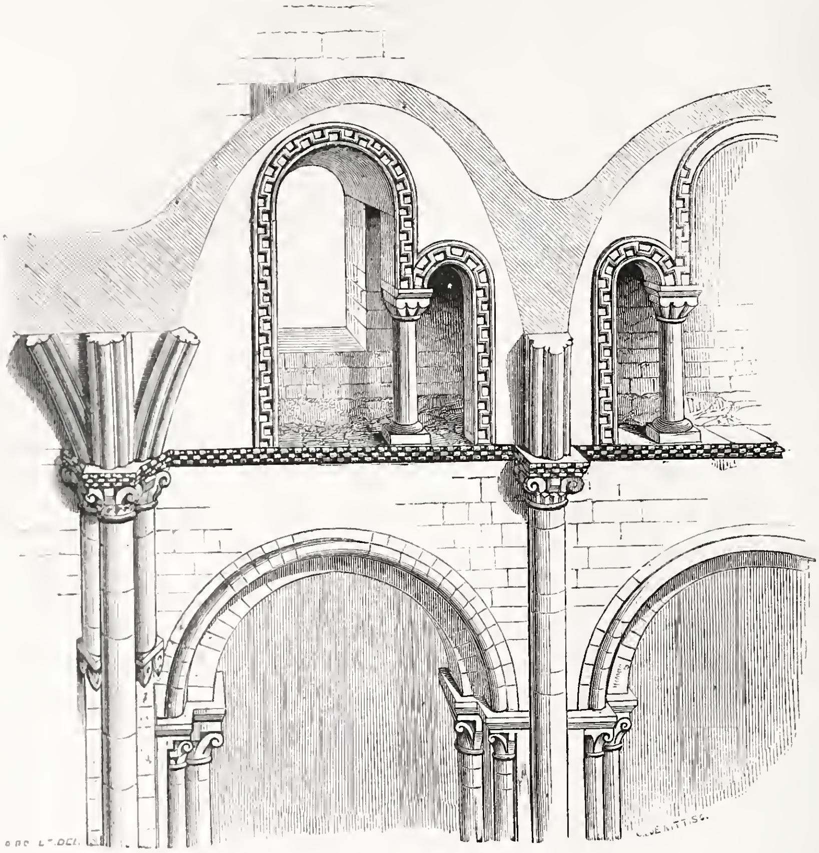
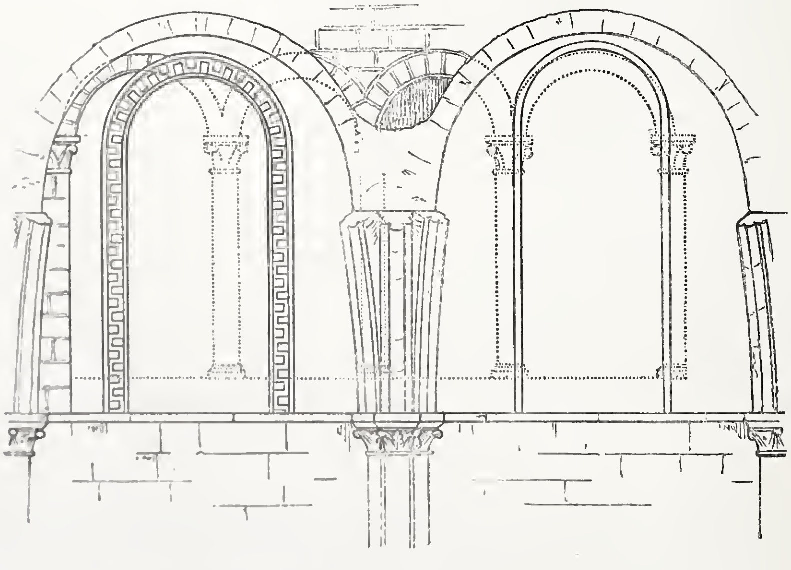
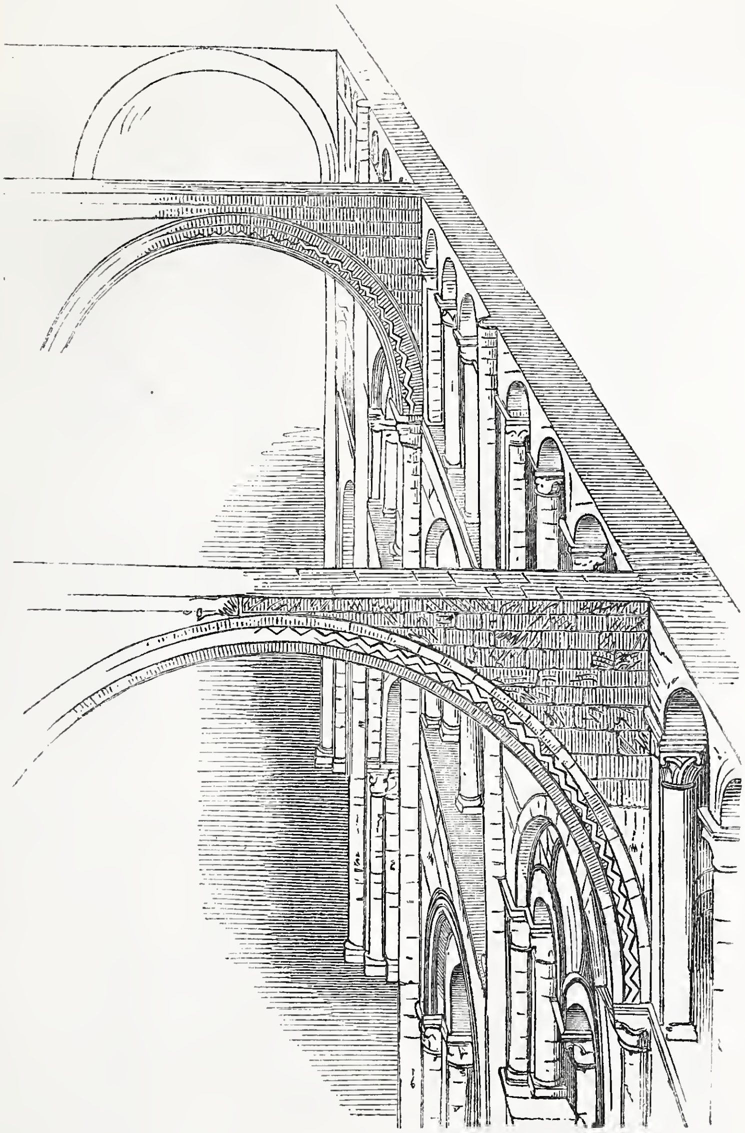
* See the tract *De Inventione Sanctæ Crucis nostræ in Monte Acuto et de ductone ejusdem apud Waltham.* With an Introduction and Notes by William Stubbs, M.A. (8vo., 1861.) " Theasaurum inestimabilem quo instauravit duas ecclesias Cadomi, ecclesiam scilicet Sancti Stephani quam fundavit pater ejus, et ecclesiam Sanctæ Trinitatis quam fundavit mater ejus, quæ scilicet usque hodie gaudent spoliis sic adquisitis, et inscripta habent nomina in ipsis capsis et textis principum qui ea contulerunt ecclesiæ Walthamensi, testimonio et auctoritate Archiepiscopi Ginsi."—(p. 32.)



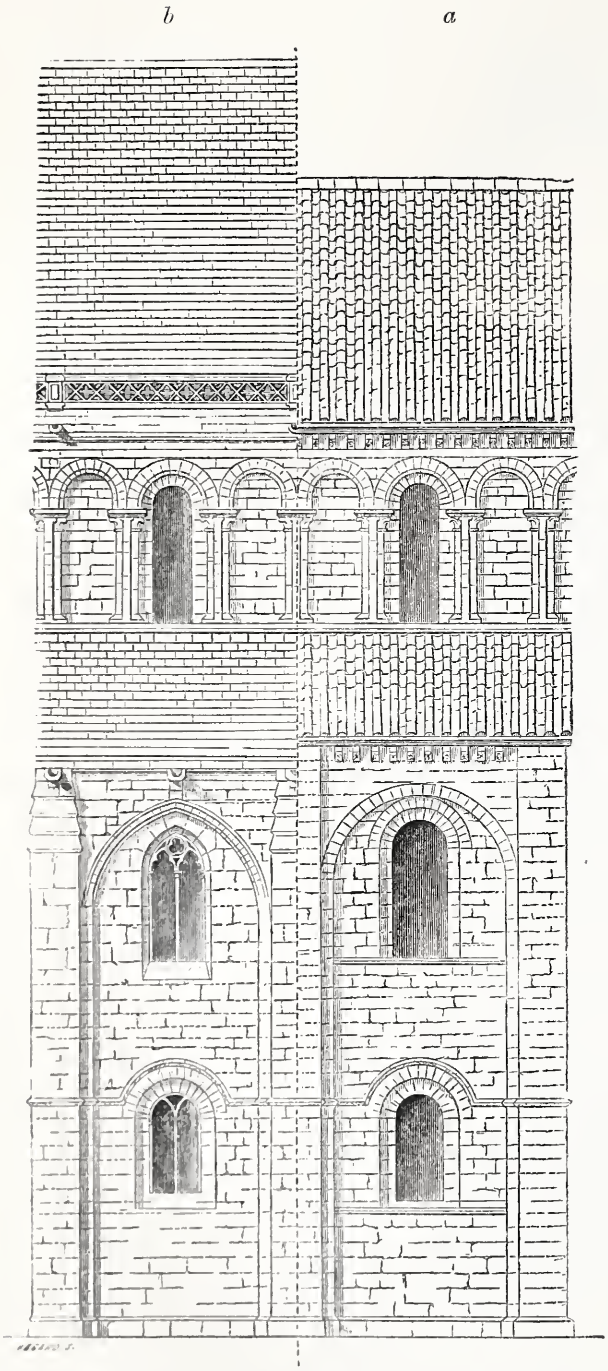
16. CLEAR-STORY AND VAULT. (Third Period).



17. CLEAR-STORY AND VAULT. (Showing the Alterations).

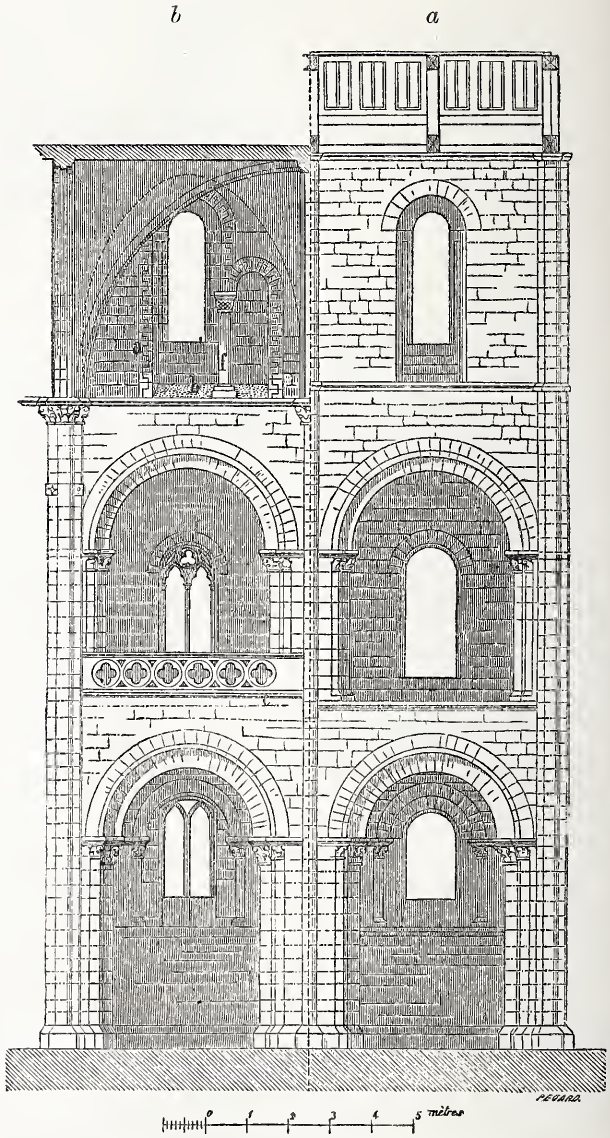


18. BIRD'S-EYE VIEW OF THE NAVE OF THE ABBEY CHURCH OF CERISY.



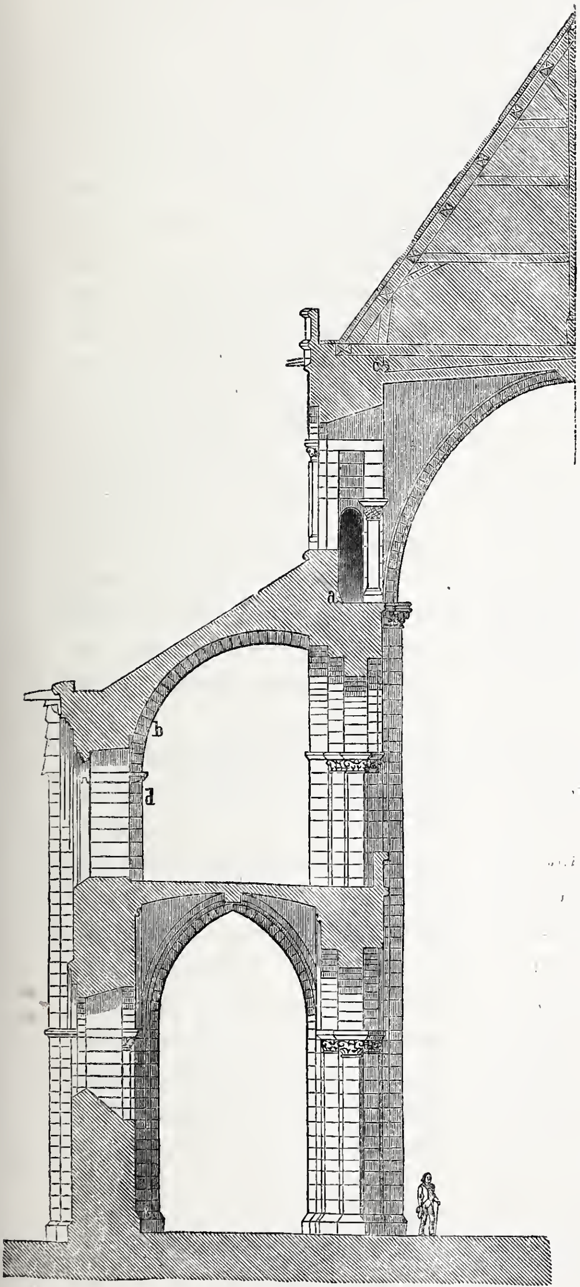
19. ELEVATION OF ONE BAY OF NAVE (EXTERIOR).

a Original state.
b After the alterations.



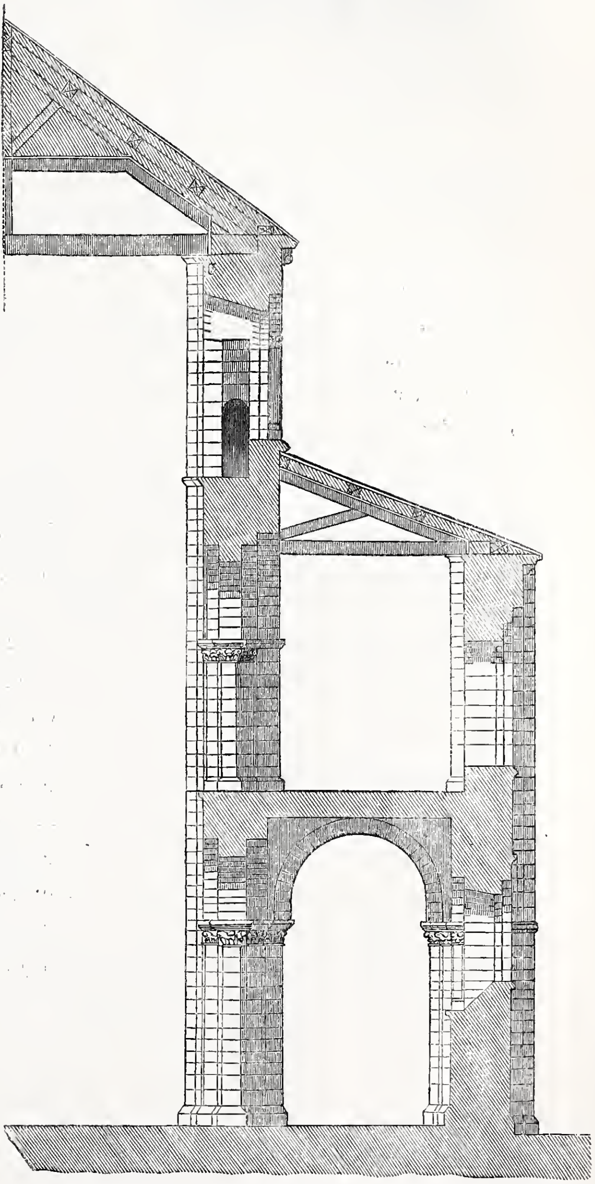
20. ELEVATION OF ONE BAY OF NAVE (INTERIOR).

a Original state.
b After the alterations.



R. ROBERT. PEGARD

21. SECTION OF NAVE AFTER THE INSERTION OF THE VAULT.

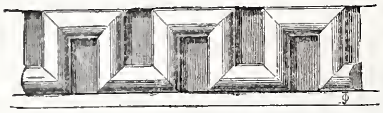


R. ROBERT. PEGARD

22. SECTION OF NAVE (ORIGINAL STATE).

a b Section of vault of aisle. c c Additions to the old walls. d Original wall.

St. Stephen's at Caen.[*] The original plan and arrangement of this church were precisely the same as at St. Stephen's, Caen, in its original state. Both have been altered, but not at the same time, and some features which are lost in one are preserved in the other. The abbey church of Bernay, which is also of the eleventh century, has preserved the same arrangement unaltered in the transepts, and is still covered with the wooden roof only. The embattled fret-ornament which surrounds the windows and sub-arches of the present clear-story belongs entirely to the later period, the middle of the twelfth century. It is an ornament which never occurs in early work, and is not found in any of the churches mentioned as corresponding with St. Stephen's in its original state. The diagonal ribs of the vault are carried on vaulting-shafts, which do not descend to the ground, but spring from corbels inserted in the walls by the side of the original shafts, at about six feet above the floor of the triforium. The section of these shafts is quite different above that point from what it is below, the side shafts being round above and square below. At Cérisy it is evident, by the toothing-stones which remain in the walls, that the roof has been carried upon transverse stone arches across the nave at each alternate pier, which is built more massive in order to carry it. The same arrangement frequently occurs in England at a later time, as at Mayfield, and in the hall and chapel of Conway Castle. This key once obtained, explains all the details in St. Stephen's which had been so puzzling before; the remains of the old clear-story windows all come in their natural places, and the singular plan of the vault is at once explained by necessity, being caused by the previous arrangements. There can be no doubt that on these transverse arches a flat boarded ceiling was placed, as in the transepts of Peterborough; and there is reason to believe that this was a common plan in the Norman style before the builders ventured upon carrying a vault over so wide a space.



23. Embattled Fret-Ornament, Lincoln Cathedral, c. 1140.

The difference between the size of the alternate piers, already noticed as giving probability to the opinion of M. Bouet, that there were originally transverse arches of stone to carry the timber roof, as at Cérisy, is, however, if taken by itself, no positive proof of this: the same arrangement occurs at Winchester and at Waltham, which were not vaulted, and had no transverse arches, so that they must have been used for carrying the principal timbers only.

There is no direct historical evidence of the period at which this central vault was constructed, but large benefactions to the abbey are recorded in the time of Henry II., about 1160—1165, and the architectural character of the details of the vault agrees perfectly with other buildings of that period. Large donations to an abbey at any particular time are almost always a sign that some great building operations were going on, or had just been completed, and the monks were in distress, having exhausted all their funds in building, the usual mode of spending money in that age. There are no donations to this abbey of any importance recorded in the first half of the twelfth century, and the history of that time is one of continual wars and troubles, very unfavourable for building, whereas in the time of Henry II., under Abbot William II., we have a peaceful and flourishing period.

Another period of considerable donations to the abbey is about 1230, under Abbot Eudes II., and again about 1250, under Allain II.[†] These dates agree perfectly with the architectural character of the spires and the choir.

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[*] "Primium igitur ponam ipsum Ducem Willelmum patrem patriæ, qui Monasterium sancti Victoris Ceracii a Duce Roberto patre suo, antequam Hierusalem pergeret, incœptum, cœpit et propagavit; usquequo ipse Monasterium sancti Stephani et uxor ejus Mathildis Monasterium sanctæ Trinitatis, ædificaverunt Cadomi."—*Willelmi Gemmeticensis Monasterii Historia Normannorum*, lib. vii.. *ap. Du Chesne, Scriptores Normanni*, p. 278.

[†] See Hippeau, *Histoire de l'Abbaye de S. Etienne*, pp. 48, 65, 70.

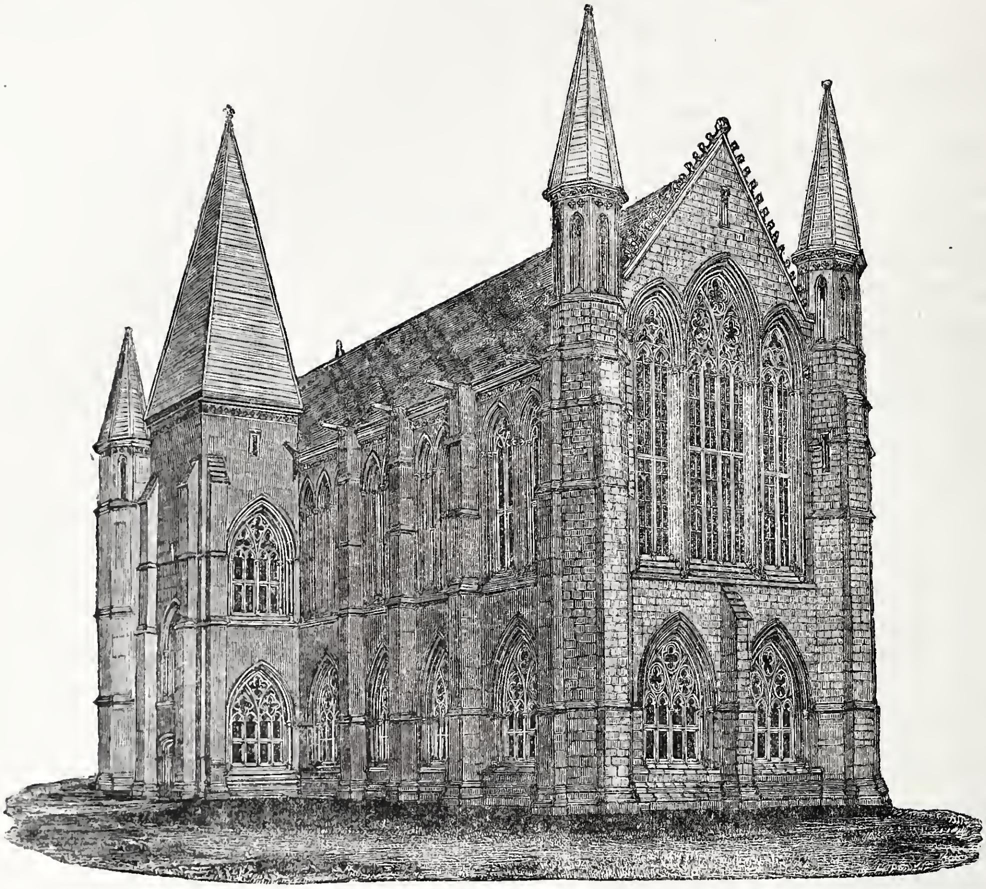
The half-barrel vaults under the roof of the aisles are probably additions belonging to the central vault; they would have been of no use before the vault was built, and were probably erected to receive the thrust of it. The arch buttresses may be original, and required to resist the thrust of the transverse arches. (See woodcut 9.) The exterior wall of the clear-story has a continuous arcade of shallow panelling, without any breaks for buttresses: this is another evidence that no vault was originally intended. The exterior of the walls of the aisles and triforum has been entirely altered in appearance in the fourteenth century, besides many modern barbarisms.

There can be little doubt that the choir belongs to the thirteenth century, notwithstanding the tradition which attributes it to Abbot Simon, 1314—1344. Some tracery has been inserted in the windows of the aisles and of the galleries of the nave, and other alterations made at that time. The work may possibly have been left unfinished for want of funds, as we find it stated that at the time of the Visitation of Archbishop Rigaud in 1250, the abbey was in debt to the extent of a fourth part of its revenue, although that was already large. The church has suffered much from violence at different times, and allowance must be made for the necessary repairs.

THE ABBEY attained to great importance and wealth; a large part of the town of Caen belonged to it, besides numerous other possessions. The buildings were constructed on a scale of magnificence commensurate with this rank, and at the time they were in perfection, in the fourteenth century, it must have been one of the finest abbeys in Europe.

Unfortunately, like so many others of the French abbeys which retained their wealth until the great Revolution, nearly all the most important buildings, including the cloister, were rebuilt in the eighteenth century in the vile barrack style which prevailed at that period, and have consequently lost all interest. These barracks have now been converted into a college, or, what we should call in England, a public school, and are well adapted for that purpose. There are, however, considerable remains of the domestic buildings which surrounded the court-yard, and their remarkable beauty attests what the whole must have been.

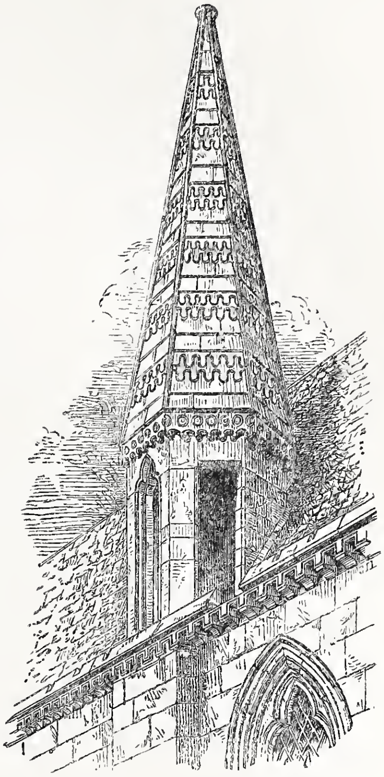
The abbey was fortified and surrounded by a great wall five feet thick and of proportionate height, constructed in the fourteenth century, of which a portion still exists; the towers and the ditches have almost disappeard, but two of the towers still remain on the side next the meadow. Within the walls of the abbey there was also a palace for the Dukes of Normandy, called the Palace of William the Conqueror; although it is probable that whatever palace he built there was of wood only: there was a Norman keep in the Castle, and it is far more probable that William's residence was there than in the abbey. The existing remains of the abbey buildings are of the thirteenth and fourteenth centuries, extremely interesting and valuable as examples of the Domestic architecture of that period, surmounted by a fine bold cornice or corbeltable, with stair-turrets, terminated by small spires of stone, the surface of which is cut in imitation of wooden shingles, shewing that the usual custom of that age was still to build of wood.



24. THE HALL OF THE GUARDS.

The most important of the abbey or palace buildings is the great hall, called the *Salle des Gardes*, to which so much attention was called by Ducarel in the last century. In its present state it is a mere wreck of its former magnificence; but enough remains to enable M. Bouet to make a faithlul restoration of it on paper. Still it gives a fair idea of what this fine hall must have been; its dimensions are 104 feet long by 30 wide. This hall was paved with a fine set of heraldic tiles, which were published by Ducarel, and gave rise to much discussion, being foolishly attributed in an ignorant age to the time of William the Conqueror instead of the fourteenth century. A series of letters on the subject of these tiles and the families whose arms are represented upon them was addressed by Mr. Henniker to Lord Leicester, and printed in London in 1794. The interior is almost destroyed, but there are remains of the painted decoration of the fourteenth century, especially in the tie-beams, of the roof, of which the patterns can be deciphered. These are very interesting, being a sort of diaper pattern with a cross *fleuré* introduced. The capital of one of the Kingports also has the old colouring, yellow leaves on a red ground, the octagonal shaft coloured red and green, and the hollow of the mouldings green. In the same building was another room, 24 ft. by 27, called the Chamber of the Barons, which was also paved with tiles; but instead of shields of arms, these represented a stag hunt. The walls and cornices were also painted with shields of arms, of which there are some remains, and some foliated panels of elegant forms.

Another part of the domestic buildings is called THE TRIBUNAL,* and is said to have been the court of justice of the abbot, who exercised considerable powers of jurisdiction. The mouldings and details of these beautiful buildings leave no doubt of their age and style. Unfortunately they have long been neglected and mutilated, and what now remains of them has been preserved entirely by accident, and their preservation is more owing to the poverty caused by the Revolution than to any zeal or intelligence on the part of the authorities. Of the other domestic buildings of the abbey historical records have been preserved, but as they have been destroyed these present little to interest English readers.



25. Top of Stair-turret with Spire, forming part of the building called the Tribunal.

The church of St. Nicholas is commonly cited as a dated example, *built in* 1083 ; but this date, like many others, must be received with caution, and requires explanation. The only historical evidence for this date is that of a charter in which Duke William grants to the abbey of St. Stephen a certain piece of waste land outside the walls of Caen, and near to that abbey. This district was then formed into a parish, and the church built by the monks of St. Stephen's upon it. All that the historical evidence proves, therefore, is, that no part of the church can be earlier than that date ; but how long it was building, or when it was consecrated, we have no evidence. The district so granted was extensive, and within it were already two small parishes with churches, which had previously been given to the abbey of Holy Trinity. This led to a lawsuit, in which it was ultimately decided that the parishes belonging to the nuns were confined to the houses built previous to the date of the grant, but all the rest belonged to the monks. In after times this led to much confusion, when the houses were rebuilt and new ones erected, but it proves that there was no parish of St. Nicolas before that time, or the boundaries of it would have been known. The early capitals in the church of St. Nicolas are of the same character as those in St. Stephen's of the second period, as in the western towers the resemblance is so close that they may reasonably be supposed to be the work of the same hands, and they are excellent examples of that rude Ionic before mentioned as one of the characteristic features of the last quarter of the eleventh century.

The Gothic portions of St. Stephen's Church are very fine, and require as much investigation to ascertain their real history as we have given to the portions in the Norman style, but such investigations would be quite unintelligible without a number of drawings or engravings. It will afford an excellent subject for some intelligent architect to work out, and as the early Gothic of Normandy is more like English than French, such a paper will be the more valuable to Englishmen.

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* This is also called *La Juridiction*, or L'Officiatate.

The CHAIRMAN, Mr. G. E. STREET, Fellow, then called upon the meeting to discuss the very interesting paper that had just been read.

Professor DONALDSON, Fellow, thought that the meeting would rather expect the chairman on an occasion like this to favour them with some observations on a subject of which he was so thoroughly master. A few introductory remarks from one so accustomed to the investigation of the history and progressive developement of buildings like this would be likely to lead to an interesting and useful discussion. He, therefore, hoped that he would, in the first instance, favour the meeting with his opinions upon the subject brought before them by Mr. Parker.

The CHAIRMAN said he had intended to avail himself of a chairman's privilege of offering his remarks at the close of the discussion. He felt some difficulty, he had no doubt in common with many others present, in following, on the spur of the moment, such a paper as that which Mr. Parker had favoured them with. He thought the drawings which had been handed round, proved, beyond question, that the works of the western part of the Abbaye aux Hommes were of different periods, because the different modes of execution of the work, and particularly the vertical joint in the masonry of the tower went to establish that assumption conclusively. The difficulty he felt was, assuming the eastern portions of the tower to be of the first period, how at that date the western front could have been completed. He did not know whether it had occurred to Mr. Parker, to attempt to reconstruct on paper the original west front: perhaps he would say this was the business of an architect rather than of an amateur.

(Mr. Parker gave some explanation of the western front from the drawing, and pointed out the piers remaining on the abbey tower).

The CHAIRMAN quite understood Mr. Parker's view, but the difficulty was to understand how the projecting turrets at the south-east and north-west angles of the tower should have been left standing so far away from the main walls in any conceivable western front.

Mr. PARKER said the French churches of the eleventh century had very often a western narthex or Galilee. He thought that might be case in the present instance.

The CHAIRMAN added that was no doubt possible, and the church of Vèzelay was a case in point. He thought they should all agree with Mr. Parker that, on the question of dates, it was much safer to rely upon the evidence furnished by the character of the work than upon the dates given by chroniclers. The account of the laying of the first stone was generally historically correct, but the accounts of the consecration of the church at two or three periods, as in this case, could only mean the consecration of various altars, as portions of the edifice were completed, one after the other. He had been much interested in Mr. Parker's description of the clerestory, and had waited to see how that difficulty would be got over. He had no doubt that the drawings exhibited by him most completely proved that the original intention was to have a timber roof. If it were not for the vertical joints in the wall behind the towers, to which he attributed great weight, there might have been some doubt as to Mr. Parker's theory, for he should not be much inclined to trust entirely to a difference in the masonry as conclusive of the different dates of the work, because if different clerks-of-the-works were engaged the wall masonry would vary, in accordance with the ideas of each; and one clerk-of-the-works would have masonry executed in a different way to others; and if they examined the chronicles of the erection of old churches, they generally found that the master-mason was often changed, and the probability was that each would introduce a change in workmanship as as well as in design. There was one point alluded to in the paper which struck him as of particular interest: that was the conversion of Monsieur Bonet from the view which he had originally maintained. The fact of an antiquary, who had long held particular views, coming round to the views of his opponents, was one of the most remarkable things he had ever heard of, and he hoped they might live to hear of a great many more such instances. The only other point to which he thought it necessary to allude, at the present moment, was as to the Gothic portion of the structure which Mr. Parker had not had an opportunity of illustrating. One could not but be struck with the extreme beauty of the chevet of the Abbaye aux Hommes, and he regarded its plan with the highest admiration. He remembered that Monsieur Viollet-le-Duc, talking of the architecture of Normandy, had somewhere characterised it as "a patois," and it was remarkable that in his Dictionary he rarely gave the plan of a Norman church, and, indeed, pretty well ignored all the churches of Caen. He (the Chairman) thought that had, possibly, been done from national feeling, and from a disinclination to study Norman work as much as he should have done; and, perhaps, from the feeling that nothing was good out of the old Domaine Royale. However this might be, he was not acquainted with any other plan of a chevet similar to this. The openings from one chapel to another produced an effect of the highest kind of beauty of light and shade, and the whole work was full of vigour and power; the same might be said of the western towers and spires. The north-west spire owed much of its remarkable beauty to the management of the pinnacles at its base. There was hardly a better spire in Europe. Just as in printing, when it was first invented, they had at once achieved perfection, and work was better executed than it had been since—so it was with towers and spires, the earliest appeared to be the best, at the same time they must give credit to the designer of the south-west steeple, for the extreme originality of the plan, and design of the pinnacles at its base, which were quite unlike the others, and almost unique examples of pinnacles, triangular in plan. These spires had been, to some extent, copied in other works in Caen, and in various parts of Normandy. He thought, having complied with the request of Professor Donaldson, in offering a few opening remarks upon Mr. Parker's valuable paper, he should best promote the discussion by calling upon that gentleman to address the meeting.

Professor DONALDSON said he had great pleasure in responding to the call of the Chairman; because if there were periods in his life in which he had received great satisfaction and, at the same time, improvement in study, it had been in his visits to Normandy. No one could enter the town of Rouen and see the magnificent buildings appropriated to all classes and purposes without being struck with the variety and charm of the architecture, and delighted with the efforts of Mediæval art, as also the perfection of the Renaissance style, which was so intimately mixed up with the history of our country that it was of the greater interest, and spoke more immediately to the feelings. Some years ago he alluded before this Institute incidentally to the buildings of Caen, and amongst others the edifice now under consideration was then brought under their notice. He had at that time remarked, that it was a very beautiful type of that class of architecture, and presented some remarkable features. The author of the paper with much aptness and feeling had alluded to the difficulty of correctly ascertaining the periods of the construction of these edifices; it is the same with respect to the consecration of churches, and he might add of the architects who built them. These were matters in which they felt great interest, because irrespective of the fabric the mind sought to satisfy itself also about its inner soul, intent, meaning, and history. The chronicles of buildings were difficult to ascertain; and it was a remarkable fact that there were hardly any reliable chronicles of churches or other buildings whatever. They seem either to have been destroyed or irregularly kept. Some dates were given for completion, which would be more properly assigned for alteration or commencement; so much were they in the dark upon these points. And cotemporary historians were sometimes more willing to give credit to the persons who lived at the period of the alterations, than to those who built the structure itself. There could be no doubt in cases like the present the consecrations took place as the several portions of the building were completed. As soon as a few of the bays were finished that part was consecrated for public worship, and as soon as the side aisles were carried up with the walls and piers to which the altars were attached, they were consecrated; which course was no doubt pursued throughout the progressive stages of the completion of the building. In the construction of these buildings the difficulties under which they were erected are to be traced. They were carried out at different periods by different men; therefore we can understand the various steps and stops which are to be found, showing that in the present day we labour under much fewer difficulties than those which our professional brethren in those early periods had to encounter. They began with large hearts and upon a grand scale, as William the Conqueror, in these churches, but his wars crippled his means, and consequently he had the great difficulties to contend with of finding the necessary funds; and afterwards probably the works were taken up and prosecuted by the clergy. It was the fact that public buildings in the present day were not carried out so slowly. They rarely lingered for the period that was occupied in earlier times. The Chairman had alluded to the chevet of this church. It was certainly the charm of the edifice from its elegance, refinement, and richness. It occurred to him that the choir was not continued on the same axis as the nave. [Mr. Parker—Not exactly]. It inclined a little to the south; and it suggested itself to him that it might be intended to represent the aureole or the crown of the Saviour; a certain halo of glory which the architect sought to carry out in the poetry of the new style. It was remarkable, that this new phase of architecture should have arrived at that perfection at this early period. The chevet was an example of the utmost refinement; and the continuation of the communication between the different divisions of its chapels was its great charm, producing a perspective and intersection of lines which was extremely beautiful. Allusion was made to the greater and less piers which were found in the nave of this church. It was a very early practice, that of the introduction of larger and smaller piers, and was a fine feature, because, instead of having a series of arches of the same size, the dimensions of some were larger than of others; and, from this emphasis given thus, the eye could appreciate the divisions and was not lost in the confusion of a monotonous continuity. At the same time this distinguishing difference in the size of the piers was not so very large, as was sometimes to be met with in other cathedrals, as Durham for instance. The question of the vaulting of the period was a very curious one, and he should like to see that subject carried further by Mr. Parker. In England they had a few churches of this period which were vaulted, as the church in the Tower of London, alluded to by Mr. Parker, which was so, but he hardly knew of any other Norman church which had the vaulting.

Mr. Ferrey, Fellow: There is Durham.

Mr. Donaldson: The vaulting there is not Norman, but Gothic.

Mr. Ferrey: It is of the Transition style, when the early Gothic was, to a certain degree, mixed with the Norman.

Mr. Donaldson said, that may be the case. There is no doubt, however, that Romsey church was intended to be vaulted.

Mr. Ferrey expressed his doubt of that.

Mr. Donaldson would state his reasons for that belief, namely, that the piers with their capitals did not seem to have sufficient finish for the present ceiling, and he could not satisfy himself that those shafts and capitals were in their place, except that they were intended to serve as vaulting shafts.

The Chairman said it occurred to him to ask Mr. Parker whether he had sufficiently examined the masonry of the piers to know that they had not been inserted or added.

Mr. Parker replied they appeared to be all originally of the same masonry up to the height of the corbel.

Mr. John P. Seddon, Hon. Sec., suggested that the original intention of vaulting might have been abandoned on account of the expense, and the simpler plan of the flat ceiling adopted, with the intention of subsequently vaulting it at a future time.

Mr. Burges, Fellow, drew attention to the fact that the nave piers are the same dimensions, both where the single and where the triple shafts occur, and inquired whether the clerestory was original?

Mr. Parker, believed it to be so.

Mr. Burges further inquired what was the date of those capitals.

Mr. Parker replied that some were of the eleventh and some of the twelfth century. It appeared, however, that those of the former period were older capitals, which had been used again, a fact which was curious in itself.

Mr. C. H. Smith, Hon. Member, said there was no doubt in his mind that all the Norman churches were intended to be groined. The Norman style had grown out of the Roman, in which, centuries previously, groining was at its perfection. He had never seen it carried to greater scientific extent than was to be found in Roman antiquities; and this Norman edifice was, without doubt, one of the descendants of those structures. It was easy to imagine that in the construction of a church of such magnitude the first thing they would do after they had erected the walls and piers, would be to protect them from the weather, by putting on the permanent roof complete. The church might then be used for its intended purpose, and the groining, which must always have been expensive work, would be executed at their leisure, or as their circumstances and funds would permit.

Mr. Ferrey, Fellow, differed from the opinion just expressed by Mr. Smith. He could mention two remarkable cases, Durham Cathedral and Christchurch Priory Church. The naves of both these churches were built by Flambard, the former after his preferment from the priory of Christchurch to the See of Durham. In both these buildings, vaulting if even originally proposed, would have been intended to spring four or five feet lower than the floor of the clerestory or upper walks. At Christchurch no preparation was to be discovered for an abutment; and, though in the case of Durham there was an abutment, yet that was put in by Prior Melsonby, when he groined the nave in a manner to assimilate with the Norman forms; although the early English style then prevailed. Unless they found some evidence that there was sufficient constructional resistance to meet the thrust of the groining, they could not conclude that it was ever originally intended; he did not believe that all the Norman churches were intended to be vaulted. When they came to the thirteenth century, and the early English style prevailed, pointed vaulting was often constructed upon Norman walls. The pointed arch did not exert so great a thrust. Thinner walls, with flying buttresses, were then introduced. He believed that the early Norman churches were intended to be finished in the way in which Peterborough cathedral was ceiled.

Mr. Donaldson said that, historically speaking, in his opinion, both the gentlemen who had just spoken were wrong, because, in the early Christian edifices the type followed was not the old Roman, but rather the Basilican, which always had the flat roof and flat ceiling.

Mr. C. H. Smith wished to add a remark with respect to *thrust*. Unless there were vaulting there would be no thrust. The course would be first to build up the walls, and then to put on the roof, which was of no considerable weight; and when it was wished to erect the stone groining, then would be the right time to build the flying buttresses. These must have been erected at the same time as the vault, otherwise there would be a tendency in them to thrust inwards, as well as for the groining to push outward, which the roof and centering might, to some extent, counteract.

Mr. W. White, Fellow, said that he knew an instance in Hampshire of a Romanesque or

Norman chancel, which was vaulted, still he did not think that it carried out Mr. Smith's view; but that it rather exemplified what Mr. Ferrey had said with regard to wherever vaulting had been intended, there would always be proper means of resistance or abutments provided to receive the thrust. In one of the cathedrals in the North of England, the vaulting shaft was carried up to the wall plate evidently without any intention of bearing on a vault. His impression was that was the case at Chester.

Mr. BURGES said it was almost always done when a wooden ceiling was intended.

Mr. DONALDSON asked why should it be done ?

Mr. BURGES replied that it was to afford a corbel for the tie beams. In aisle vaults the thrust on one side was provided for by the weight of the clerestory; but for want of sufficient buttresses, the other side was often thrust out, as at Waltham Abbey, where the aisles were groined, but the walls were not strong enough to sustain the pressure. At Waltham, also, and in most of the Norman churches, they might call the pillar which runs from the ground to the wall plate a vaulting shaft, but it was partly to divide the bays, and partly to act as an extra support to the tie beam, and thus diminish the span by a couple of feet. If we could be transported to Norman times, he doubted whether we should ever see an open roof in a church, or even a coved roof, or indeed any other than a flat ceiling. Most Norman churches he had seen had flat roofs, or the collar might be put a little way above the wall plate. Mr. Burges concluded by saying that he believed the Norman architects did not vault their clerestories because they were unable to do so.

Mr. PARKER observed that in the transepts of Peterborough the ceiling was flat. The shafts ran up to the ceiling just the same. In England there were numerous examples of stone arches carrying wooden roofs; such as in Conway Castle, Mayfield, &c.

Mr. C. F. HAYWARD (Hon. Sec.) remarked that Mr. Smith appeared to have forgotten the intervening period between the Roman vaulting and the Norman—a period which might be termed Pre-Gothic, and which produced the Romanesque Basilicas and Churches to which Mr. Donaldson had referred. For example, at Pavia, San Michaele, and at San Zenone, Verona, though not so early, perhaps, at any rate showed the arrangement very perfectly at the present time. So without going into dates it was not difficult to understand the system of roofing shown by vaulting shafts and arches carried across the nave, as it seems was the case with this Abbaye aux Hommes at Caen. Whenever the groining of the roofs had been added it was evident that at one time a flat ceiling *might* have been put on, and the arches stood without groining having been thought of or intended. He should have been very glad if some gentleman had been able to say a little more with regard to that particular part which Mr. Parker had hinted at, viz. the Gothic part of this church. He (Mr. Hayward) had lately been at Caen, and his visits to this church and others in Normandy had pleased him very much; and if some one would take up Mr. Parker's challenge and give the Institute a paper upon the Gothic part of the building, he was sure it would be duly appreciated by the members. There was one point in the paper which no previous speaker had touched upon, which was however constantly being referred to in that room, and could not be mentioned too often. That was the over-restoration which was going on in France, more especially in this very town of Caen. In his visit to that town he was horror-struck when he got to the Abbaye aux Dames and found that scarcely a piece of wall there could be with safety regarded as old, in which he could put any belief that it was genuine. The whole of the interior of the church had been scraped, and the whole of the fronts rescraped and repatched, the public having been shut out whilst the work was being done; when it was reopened, it might as well be said that it was a building of the nineteenth century, and not of the period to which it was attributed; because mere tradition was one's guide respecting the date of this church now. It would puzzle the most enterprising antiquary, even Mr. Parker himself, to tell what was old and what was new from the evidence of the masonry. The same sort of work was carried on to as great an extent nearer to Paris, and indeed throughout France, and it was a matter which this Institute ought to take more notice of than it had done.

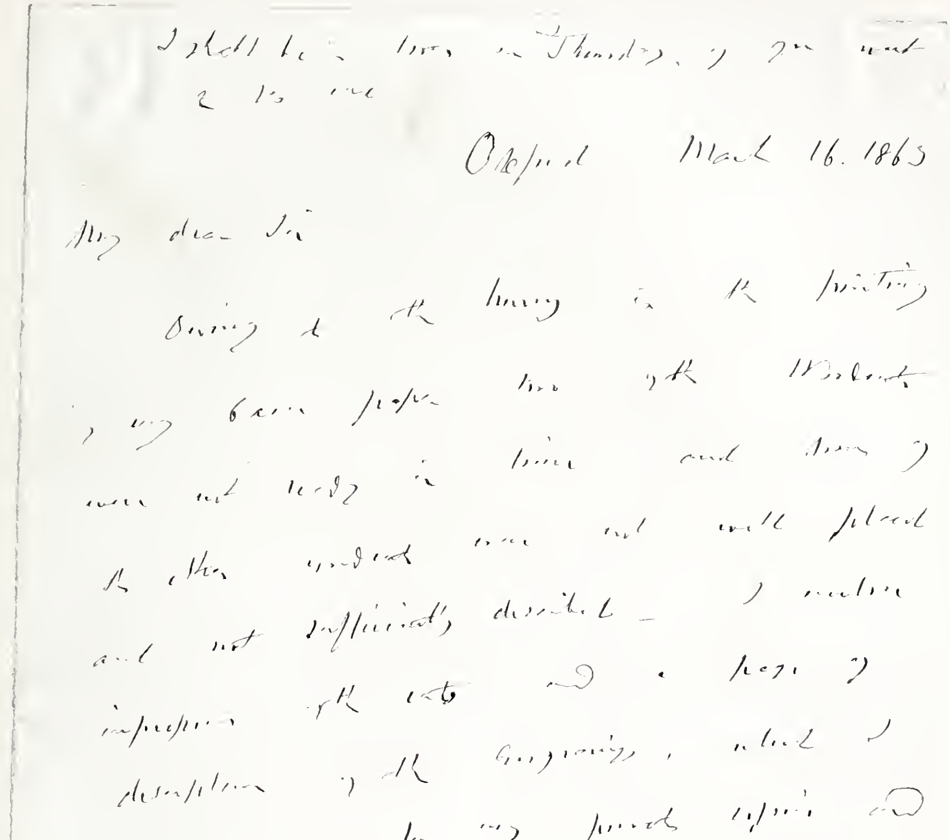
Mr. C. W. Smith begged permission to add a few words with reference to the stone used in the buildings at Caen, which was a subject of interest in the present day, when the cost of buildings was of so much consideration. He was astonished to find what an extraordinary degree of perfection these old buildings were in as regarded the preservation of the stone compared with Caen stone in modern buildings, even in Normandy itself. All the recent buildings were of Caen stone, but a most extraordinary difference was presented in its condition as compared with that of the old structures; and he would urgently warn younger members of the profession against the idea that for a moderate cost they could erect buildings of Caen stone in this country, likely to endure for ages without mouldering to atoms. Having been informed by apparently good authority that the buildings in Caen, erected from the eleventh to the fifteenth century, were of the stone of that locality, the same as is now in general use, he felt very anxious to find out the truth of the matter. He considered from his own experience that the stones in the more modern buildings could not have been taken from the quarries which had supplied the materials of the older structures, and looking over an old map of the locality he found places named in French, "The Hollow Way," "The Old Quarry," "The New Quarry," "The Little Quarry;" all of which were situated in the immediate neighbourhood of the great churches and castle of Caen. In fact there were quarries almost underneath the churches, which had been deserted for three or four centuries; and upon going inside them he found there was stone precisely similar to that of which the old churches were built,—which, although of the same geological series, is very different in point of durability from that Caen stone of which the modern buildings in London were constructed. There was one church in the town of Caen to which he paid particular attention—he understood it to be the church of St. Pierre—the elaborate stonework of which, probably of the fifteenth century, was in an almost perfect state of preservation. No stone at present brought from Caen would bear anything like that degree of weathering, and therefore he hoped they would not think that the Caen stone of the present day was equally durable with that of bygone times.

Mr. Donaldson rose to propose a vote of thanks to Mr. Parker for his paper, to which the discussion which had followed upon it formed a valuable addition; and he was sure the meeting would be inclined to render that gentleman a greater tribute of respect, inasmuch as he was an Honorary Member of the Institute, and had been elected such on account of his personal merits, and the services he had rendered to their art.

Mr. John P. Seddon (Hon. Sec.), having seconded the vote of thanks to Mr. Parker, said, it was many years since he had been at Caen, yet he still remembered being much struck with this church, and particularly with the stateliness of the proportions of the interior of the nave. The *chevet* also was, certainly, one of the most beautiful in the world. He, however, questioned whether he should, himself, accord it the palm of the first rank, as regards its plan, beautiful as it was. He preferred some of those in the Isle de France and its neighbourhood, such as that of Notre Dame, Chalons-sur-Marne, and that at St. Quentin; that, however, was a matter of individual opinion. This question of the roofing was one of great interest. He was not wholly satisfied with the explanation given. It seemed to him that the triple bearing shaft must be intended to carry something more than a mere wooden roof, even if supported by a cross arch. The spaces between the main arches would appear to be too wide for such treatment. It was a subject, however, which deserved further investigation.

The Chairman said, before putting the vote of thanks to Mr. Parker, there were one or two remarks made by the speakers which required a little notice before they were passed over. As to the subject of groinings on the naves of our great churches, there was no question, in his mind, that they never had them, nor were intended for them. There was no subject so interesting as that which arose out of the groining of churches, and the difficulties of groining, and the manner in which they were contended with were well worthy of notice. There was a remarkable instance of vaulting in the main nave of Fountains Abbey, where, instead of the ordinary cross vaulting, it crossed at right angles, and was of the strongest construction, with a succession of cross arches one below the other: but then they had a timber roof over the clerestory. Then there was another kind of vaulting called the waggon vault, in the Romanesque style, examples of which were found in the churches of France and Spain, where they found the finest possible vaulting. He quite echoed what Mr. Hayward had said, that they wanted further information upon the Gothic work of Caen, which he was sure would be studied with advantage, both by the old and young members of this Institute. He now begged to convey the thanks of the meeting to Mr. Parker for his paper.

Mr. Parker returned thanks for the kind reception his paper had met with, and if it had afforded them interest or amusement, he was very glad of it. He thought the vaulting of churches of the twelfth century one of the most interesting subjects they could investigate. He believed they had no large spaces vaulted in this country till the middle of the twelfth century, and the same remark applied to Spain and France.



I shall be in town on Thursday if you want to see me

Oxford March 16. 1863

My dear Sir

Owing to the hurry in the printing of my Caen paper two of the Woodcuts were not ready in time and some of the others inserted are not well placed and not sufficiently described — I enclose impressions of the cuts and a copy of descriptions of the Engravings, which I have printed for my private copies and I would suggest that you should reprint them in the next part of your Transactions — If you approve of this let your printer apply to Mr Bartell for the blocks. I am going to Paris on Thursday night or Friday morning, and shall be absent about three weeks

Yours truly J H Parker

A DISCUSSION UPON THE PRACTICAL VENTILATION OF BUILDINGS,

At the Ordinary General Meeting of the Royal Institute of British Architects, February 7th, 1863,

W. Tite, Esq. M.P. President, in the Chair,

WAS OPENED BY

Mr. F. Marrable, Fellow, who spoke as follows: Mr. President and Gentlemen—I have been requested by your indefatigable Secretaries to say a few words this evening on the subject of Ventilation, and I have consented to do so, although with extreme diffidence, as it is a question to which I have never turned any very serious attention, nor have I ever made a study of the science of Pneumatics. I have written no paper for this occasion, but have merely jotted down a few memoranda, as my object will be rather to promote a discussion, and to draw forth the views and experiences of others, than to lay down any dogmas of my own. But I believe that much good will result if, in a friendly manner, the members of the Institute will give their practical opinions of the experiments they may have tried, and of the successes or failures that may have resulted. As I said before, I have no intention of treating the subject scientifically—upon the present occasion, at least—nor do I mean to say anything upon the subject of ventilating large public rooms, where great numbers of people may be at times assembled; but I wish rather to direct attention to the various means and appliances of an inexpensive nature that appear ready to hand, so that we may see whether we may not render our ordinary dwellings more healthy and comfortable than they are at present, and, by the exercise of a little foresight in planning buildings for domestic purposes, obviate many of the evils that we have all endured, more or less, from the want of a proper circulation of air in the rooms in which we live, and which the very general use of gas, as the cleanliest, most economical, convenient, and, under proper circumstances, the best artificial light, renders absolutely necessary; while the use of plate-glass windows, with closely-fitting sashes and doors, which are sometimes rendered air-tight by a most ingenious "dust and air excluder" of india-rubber, prevent the admission of air into the apartment through the many chinks and crannies that the rougher joiner's work and latticed windows of our forefathers gave free ingress to. I must start with the axiom, that to insure ventilation, we must have the means of letting fresh air in and foul air out; and if, in detailing the means I have or am about to adopt, I am guilty of using the personal pronoun rather frequently, you must exonerate me of any desire to talk too much of myself; and, in so doing, bear in mind that I lay myself open to your criticism, and even censure, if, in your own experiences, you have tried the same means and found them to fail. I have no diagrams to lay before you to-night, as I trust to be able to make all I may say clear, with the aid of the black-board and a bit of chalk. The first ventilator to which I will draw your attention is one that I saw in the Eastern Annexe of the International Exhibition, and which is now, I believe, pretty largely advertised, and which, I think, may be made available for drawing off the foul air from the top of a room, without any, or scarcely any, additional expense, if provision be made in the first instance—that is, when the building is being erected. Of course, its adaptation to an old building would necessarily be attended with expense, more or less. It is the invention of Mr. Haworth. Here is a small model of it. I was in hopes I should have had the same model as shown in the Exhibition, and which elucidated the matter very fully. As far as I can ascertain, if it is as nicely constructed as those exhibited, it will have the effect, whenever there is a breath of air blowing, of drawing the foul air out of the room. This whirligig moves with a very slight puff—I can blow it round with my breath; and I can even blow one of the ordinary size, 14 in. by 9 in., with great ease, and it will act for some time without further impulse. There is an Archimedean screw fitted below it, which will, I believe, draw out the foul air; but it does not supply fresh air, (if I understand it rightly,) and in so far it is defective. The fresh air must be admitted by a door, a window, or a grating. As long as it remains in good order, I believe it will be self-acting, if there is a puff of wind blowing. I do not see in this small model, as in the full-sized apparatus, the means of supplying oil. It is stated that a sufficient quantity of oil might be poured into the duct to keep it going for about two years. It was proposed that this ventilator should be applied to smoke flues, and also as a cure for smoke chimneys. It may certainly be applied for that purpose, but there is one objection—the flue must be kept clean, or, in all probability, the ventilator will cease to act. I think, however, that, under many circumstances, it is a ventilator that may be adopted with much benefit, and where a dry flue—that is to say, not a smoke flue—can be obtained. In a new building it may be easily applied, with many beneficial results. I have an intention of using them myself, by carrying a duct between the joists of the floor into a dry flue in the wall, and I hope they will prove effective. (Mr. Marrable then explained, with a piece of chalk and the black-board, the means he was going to adopt of admitting fresh air into a villa residence which he is about to erect, but it had yet to be proved whether the plan would be successful.) I also intend (he proceeded to say) to employ this ventilator, to a limited extent, for ventilating the principal rooms of the Garrick Club; but here I have other means of ventilation—by means of sun-lights—and there are also ample means of letting fresh air into the room; and I believe I may be able to draw the foul air out by means of this ventilator. I may say that, in this case, by the desire of some of the members (I will not be answerable for it myself), the fresh air is to be admitted under the floor of the room, and will come through gratings in the centre of the room, which will be covered by tables or sideboards, which will probably disperse the air. But I have taken means to shut it off, in case the draught should be too great, as I have not much faith in it myself. The foul air will be drawn off through a perforated ornament in the cove of the ceiling. Watson's ventilator—the syphon ventilator—with which you are all probably more or less conversant, appears a good means of obtaining a general circulation of air in an ordinary dwelling-house, by converting the staircase into a ventilating shaft. But the great objection to Watson's ventilator is, as far as I know, that you must have a vertical shaft, and there is a difficulty in obtaining that, particularly in a dwelling-room, and you cannot carry it through the room above the ground floor, except under most extraordinary circumstances. This vertical shaft must communicate directly with the external atmosphere. I think Watson's ventilator good under certain circumstances, and I believe that the ventilation of the room in which we are now assembled might at least be improved by the introduction of one or two of them. The shaft need not necessarily be in the centre of the room, but I believe it will do in any part of the room, so long as you get a vertical shaft. The principle of Watson's ventilator is that of the old-fashioned up-and-down shaft, very much used in mines. I do not know that there is anything particularly novel in it. The shaft is divided into two, and the air passes down one and up the other, depending upon the direction of the wind as to which is the up and which the down shaft. There is one objection to this, viz., that you cannot very well disperse the draught, because you do not know which way the wind is coming. This brings me to another method, invented by Mr. Mackinnell; and as far as I have been able to ascertain, I think that is the most favourable for ordinary purposes. The principle is nearly the same as Watson's, but I think it will supply fresh air to any room in any part of the house. There is a horizontal shaft for the admission of fresh air, and the exit shaft may run partly horizontal, and then vertical, when you get into a convenient position. I will not take up your time in explaining these models, because Mr. Mackinnell is in the room, and will be glad of the opportunity of showing them to any members who may remain after the general meeting has broken up. He will be better able to exemplify them than myself, and the members will see that air (here exemplified by smoke) drawn in by one flue is rapidly passed out of the other. Of course, any ventilator must be self-acting, to be generally useful; and that which requires constant attention, or any mechanical appliances, must fail. We cannot expect to keep servants constantly turning a wheel, winding up weights, or setting springs in motion. The apparatus, to be effectual, must be self-acting. There are three modes of supplying fresh air, under different circumstances, shown by the models on the table: the one, with the vertical shaft; the other, where a throngh draught can be obtained from wall to wall, between the joists of the floor; and the other, where that through draught might be interrupted by a girder or intervening wall, so that it becomes necessary to take the inlet through the same wall as the outlet. The principle, as I said before, is nearly the same as Watson's, except that there is a means of dispersing the air as it comes into the room; by a sort of spreading apparatus, it is driven along the ceiling, and becomes mixed with the warm air of the room before it descends into the apartment. The principal difference between this ventilator and Watson's is, that the shaft, instead of having a central division, has one tube contained in another, the fresh air being admitted by the outer tube, the foul air passing out by the inner tube. I will not draw that on the black-board, because I am sure Mr. Mackinnell will be better able to explain it than I am. In regard to Arnott's ventilators, I will say but little. There are objections to them; one of which is, that they almost always admit blacks into the room, where they do act—but more often than not, I have found they would not act at all. I have tried them in several instances, and found them productive of nuisance, more or less, in each case. They require to be kept remarkably clean, and want oiling now and then—that is, the pivot on which the valve turns. As I said at the first, it is necessary to draw the foul air out of a room, and to admit the fresh air into it. Mr. Mackinnell's ventilators do that, and so do Watson's, to a limited extent. Of course, in winter, the air must be warmed before its admission into the apartment, or brought in in such a manner as that, by its speedy admixture with the air of the room, no inconvenience is felt from draughts. There are several stoves for admitting fresh air into a room. Taylor's is one of them, and it may be used with advantage under some circumstances; but it requires great care and cleanliness. When the fire is lighted, warmed air is sent into the apartment by the same ducts that will admit cold air in the summer time. The London Warming Company, in George-street, Westminster, have also certain stoves, on a somewhat similar principle, by which fresh air may be admitted, warm or cold. The subject of warming is intimately connected with that of ventilating, but it is hardly the subject I wish to go into to-night; and I have opened this discussion rather with the view of getting the opinions of others on the ventilators that have been tried by them, so that they can give us their practical knowledge of the subject. I have no personal interest in any of the inventions here brought forward. As I am not reading a paper, or delivering a lecture on the subject, but simply opening the discussion on the subject, I shall now leave it with you to give your experiences on the different methods you may yourselves have employed, or that may have come under your notice.

The President.—I think my friend's suggestion of a discussion on this subject a very excellent one; for the question has always given men engaged in practical architecture a great deal of trouble, and occasional disappointment. The great experiment of ventilating the Houses of Lords and Commons, as you know, which cost thousands and thousands of pounds, I suppose may be declared—except, perhaps, as regards the House of Commons itself—a notorious failure. You remember it was taken out of the hands of the architect, and put into the hands of a scientific person, whose scheme did not appear to be practical, in any sense of the word. The arrangements of Mr. Gurney are comparatively useless in hot weather; and there is no doubt whatever that on such occasions the ordinary old-fashioned remedy of opening the windows is the only resource we have by which we are able to breathe. The amount of fresh air now introduced into the House of Commons is considerable, but the means for introducing it are very extensive, and the annual expense very large. I never could find any great amount of trouble in getting the air out of any apartment, the great difficulty has always been how to get it in, without draughts. In the House of Commons the system is this: the floor is of iron, and of open work to such an extent, that if you were sitting on one of the benches of the House of Commons, and looked through the matting carefully, you could see into the room below. The cast-iron floor is perforated throughout, and covered with cocoa-nut matting; and the air is, of course, by this contrivance, split up into small portions. Certainly there is no sensation of draught anywhere. There is this mischief, however: when the weather is bad for a considerable length of time, the mud carried in on the boots and shoes of those who frequent the house, dries, and the dust is extremely perceptible and inconvenient, notwithstanding the pains taken to remove it. The real question is, how to introduce air with as little offensiveness as possible — to get it in without its being annoying, and perhaps mischievous, to those who sit inside the room. The difficulty of this is very great indeed. The right way for us to come to some practical conclusion is for each of us to compare our practical experience on this subject with the experience of others. We are very greatly obliged to Mr. Marrable for having introduced the question, and I hope the discussion will be continued, and be the means of leading to good results. I have now to leave the chair, on account of public engagements, and I have therefore to ask that Mr. Ashpitel will take my place for the remainder of the evening. This is a grave and important subject, and there is a great mass of information to be gathered from a discussion of it. I ask you to take it up in the spirit in which it has been commenced—that is, in the honest admission that we are desirous of obtaining some practical results upon so very difficult and important a question. I now leave the matter in the hands of the Vice-President, and would suggest to him the importance of urging it forward as much as in him lay. For my own part, I am sorry I cannot continue with you any longer to night. Mr. Tite then vacated the chair, which was filled during the remainder of the evening by

Mr. ASHPITEL, V.P., who called upon Mr. E. Barry, who had paid a great deal of attention to the subject, and knew more about the Houses of Parliament, perhaps, than any other member present.

Mr. E. M. BARRY, Fellow, said he was afraid he knew very little about what is now being done at the Houses of Parliament as regards ventilation; but he did not think that Dr. Reid's experiments were very successful. Mr. Gurney had, he understood, introduced some valuable improvements; but he doubted, however, whether he could have done so if he had not possessed the control of ample funds, as he has resorted to various expensive arrangements. He uses, he believed, fountains to purify the air at its entrance, and then causes it to pass through dropping water, gratings, and silk. In fine weather, Mr. Gurney's system appears to be successful; but, in wet weather, the dust which rises from the floor, and is carried upwards by the entering air, is said to be very objectionable. As regards the extraction of the vitiated air, Mr. Gurney used, and, he understood, still uses, a large chimney or tower about 15 feet square, with a fire of coke in it, on an iron grating fixed near the top of the tower. This fire is kept constantly burning during the sitting of the House, and no doubt does its work effectually (though expensively), as the House of Commons is now certainly one of the best ventilated buildings we have. Dr. Reid was very successful with the temporary House of Commons, and the reason probably was, that he could alter as he pleased a mere temporary erection of lath and plaster. Dealing with a permanent building was more difficult, and here Dr. Reid failed to give satisfaction. Ventilation is doubtless one of the greatest difficulties with which architects have to contend, and not the least arduous part of the problem is to induce the public to appreciate its necessity and advantages. Living-rooms are constantly fitted with sand-bags, draught-excluders, and other contrivances for excluding every breath of fresh air, and only lately, on going into a nursery, he observed that even the key-hole had been stopped up with cotton. The ventilator before him appeared to be an ingenious arrangement, but he should fear it would prove difficult to be kept in order, and it seemed to him likely that its action would soon be impeded by dust and dirt, as well as by the soot from neighbouring chimneys. As regards Watson's ventilators, he could not say that he had found them very successful, though he thought they possessed advantages in cases where, in spite of draughts, a rough and ready mode of ventilation was not objectionable. In other instances he could not recommend them. In spite of some instances of failure, Arnott's ventilators have often been used by him with advantageous results.

Mr. Jennings, Fellow, said he thought, as it was stated by the President, that the most important thing to do, was for each to state his own experience on the subject of ventilation. He had found no difficulty in respect to Watson's ventilator, though, certainly, in one building he had found that it was frequently closed. There were, he thought, some general principles which required consideration, in the method by which ventilation for practical purposes should be carried out in ordinary rooms. One of the most important points is to consider in which part of the room it is practically most convenient to admit the air. His own experience, certainly, was in favour of admitting fresh air at the top of the room: he was aware that persons would say, that was where the foul air was, and where it ought to escape, but he thought it would be found that practically, if it was admitted at the top of the room, it was less apt to be stopped up, and in passing to the fire-place, it did ventilate the room better than by any other method. It also occasions less perception of draught. He had found this to be the case in his own office, close to the ceiling of which there is an old flue, which he had used for the purpose. It might be a question whether, in constructing a new house, the air might not, to great advantage, be admitted, not at the ceiling, but half way up the room; and, if horizontal flues were built into the party walls, so as to admit the air along the party wall into the room in the most convenient place, ventilation might be well managed in that way. That was in some degree the plan proposed by the double flues, which were introduced by Bolton and by George Jennings; but the objection to them, as in most of these cases, is the expense. The principle of a double flue is the very best, because the inner pipe becomes heated from the fire-place, and air passing round it in the outer pipe enters the room, and the full advantage of the fresh air being admitted, warmed in some degree, is obtained. It is not sufficiently warm to render a fire in the room unnecessary, but cold draughts are avoided. Another point, which has to be considered in artificial ventilation, is how far it is possible to drive in warm air. One of the most successful experiments that he had seen in this respect was that in use by Mr. Thomson Hankey, Governor of the Bank of England, in a room at the Bank, where the hot air was forced in at a considerable height up in the room; and the effect was such that the room was so thoroughly supplied with air that the door banged as it shut, not from the outward air, but from the inner, which found a difficulty in getting out. He believed the system is not continued there, and, therefore, he supposed, either the expense or some other practical difficulty had caused it to be disused. At the Old Bailey, he believed the air is driven in by a fan, and that it acts fairly. But it is quite out of the question for anything referring to private houses. In another place, where doors are constantly opened, he tried a plan which he found to work satisfactorily, but it had not been long in trial—that is, of having a furnace in the basement story, which supplies a number of plates heated by hot water. Through these plates the external air is admitted, and being heated, rises into the room. This method will bring the room up to a heat of seventy degrees; so that he expected it would work perfectly well. The air is admitted by two pedestals, through which it is brought from the floor. They admit and divide it very fairly: but, of course, the place of admission is very important. At the top of a house of his own he had put in a flue, having a gas stove immediately under it, and he had been rather surprised to find that directly under the ceiling, with which the flue communicated, the air came in instead of going out; and, he believed, that was always the difficulty one had to bear with, for the draft would sometimes take the wrong direction.

Mr. Penrose, Hon. Sec. F.C., said he would mention two cases in which he had adopted a plan something like what Mr. Jennings had described,—by means of a furnace in the basement,—and which appeared to answer very well in supplying rooms of a moderate size with air: in both cases he had merely taken advantage of the back of the kitchen fire, and brought the air through tubes into the rooms. He had adopted the plan of introducing the air at the skirting, but he was of opinion that at the top of the room would be better. Care should be taken to make the flues large enough; little good is obtained by the use of a four, five, or six inch tube, it ought to be very nearly as large as an ordinary smoke flue, to produce the proper effects.

Mr. Jennings.—I believe we have all found it requisite to provide that the air, if admitted cold, should have a hole for its entrance of half the size of that for its exit. If the holes are the same size, failure will result.

Mr. John P. Seddon, Hon Sec., said he must join issue with some of the gentlemen who had spoken, as to the position of the opening for the admission of the air. It seemed to have been assumed in the present discussion that this must necessarily be either at the bottom or at the top of the room; but he would suggest that it should be near the middle. Not long ago, he was at the house of a physician, who called his attention to the admirable way in which his rooms were ventilated; air was admitted in considerable volume through a bracket about six feet from the ground—just above the level of the heads of those occupying the apartments—with an upward direction. This he contended,—and it appeared with reason,—was the only proper method and position of admitting fresh air; no small quantity of which must necessarily be admitted to supply what is extracted by the flue, and which, entering from any other point (except the fire-place) usually causes an unpleasant draught. If you bring it in from the top of the room, whence it ought to be going out, you get a current down upon the head and cool the foul air, the heat of which is the sole motive power for its escape. If you bring it in from the bottom of the room, unless warmed, you get your legs "*literally cut off.*" He himself was called in not long ago to see what could be done to obviate some of these disagreeables in a room. There had been an open place above the window, and the cold air came in so violently that that had to be stopped up, and then it was found that the chimney smoked and draughts came from the doorway. Then the door was listed all round, which made the chimney worse. There had been a space above the door, which was stopped up also, so he told them to take off the list from above, but not from the bottom or sides, and to take an additional shaving from the top of the door to make that space wider. In fact, to let in as much air as they could where it would not inconvenience them. Undoubtedly, *in his opinion*, the best position for bringing cold air into a room is at so high a point as to blow over the occupants, and at as low a point as possible to secure that condition. But if the air be not cold, the case is different. If warmed, by means external to the apartment, it may be brought in from the bottom, as from the skirting, or even the floor, *e. g.*, in Houses of Parliament,—*pace* the dust. Or, it may be brought to the fire-place, and, warmed thereby, issue thence into the room with admirable effect, so long as care is taken that it be not overheated or burnt. This is obviated by the use of firebrick, as in the grates of Taylor, Pierce and others. A friend told him that he had a small room, which he could not occupy in winter, for he was almost blown out of his seat by the wind from the doorway, and though burnt on the one side by the large fire he made, he felt frozen on the other. Being somewhat ingenious, he bethought him, at last, to bring in a piece of iron gas pipe from the outer air through the fire, and then bend it so as to enter the room above the top of the chimney piece, and immediately he had done this the room was perfectly comfortable, the blast of warm air coming through the pipe sufficing to supply the fire, and, therefore, it did not come in from the doorway as it did before. Referring to ventilators he said he had tried one,—not Watson's, but almost upon the same principle,—"Muir's four-point ventilator," which differs only in being divided into four compartments instead of two, so that whichever way the wind blows it would go down one side. It was certainly successful in one point—viz., the admission of air, for it was put over a kitchen, and it nearly blew the cook out of the kitchen. Of course this could be regulated. But still the air by its use comes in at the top of the room, which cannot, as he believed), be as satisfactory as if it was brought in just above the head. It might be brought into a meeting room like this, behind each pedestal, and would, he thought, be quite certain to effect its purpose. He was informed that the North and South Wales Bank, at Liverpool, is ventilated successfully by one of Watson's ventilators. It was previously in an exceedingly bad and unwholesome state for want of ventilation. The interior is, however, very lofty, and, therefore, the air entering has plenty of space to disperse itself in before it can reach the occupants. The next point to be alluded to is the egress of the foul air. No doubt it is said with truth that Arnott's ventilator often does not act; and, I think, Mr. Taylor, in his paper the other evening, told them why—viz., that the ordinary flue was not sufficiently rarified. The flue has as much as it can do to carry off the smoke, together with the air, which is generally allowed to escape with it from the fire-place; but, if, (as in his grates,) the air be forced with the smoke to pass through the body of the fire before it enters the chimney, (and possibly where the fire is very large,) the flue becomes sufficiently rarified to enable it to carry off rapidly the foul air through the Arnott's valve, which under those circumstances can, and does act; the foul air can also, of course, be extracted by other mechanical means and by heat applied for the purpose. Whether such a valve as that shown, (Hawarth's,) would act long may be questionable, but even while it does act it would apppear that it is too dependant upon external influence. If the wind blew hard, perhaps it would draw too much air, and in still weather, when most wanted, probably too little; at any rate it would not, he thought, adapt its action to the heat of the room, which would appear to be desirable. Gas jets, being easily turned on and off when wanted or not, would appear to be an efficient means of extracting foul air if they were attended to, but are at the mercy and caprice of servants.

Mr. EDWARDS, Visitor, said he was a stranger, but having received a communication, had attended to hear the discussion. He wished to correct, what appeared to him to be a misunderstanding, as to Arnott's ventilator. The reason why it fails, when it does so, is for want of attention to the contraction of the throat of the chimney. If the flue be allowed to be filled with air from the fire-place, it will never draw air through the ventilator; and, therefore, to counteract that, it is proper to contract the lower part to such a space as will only take away the smoke from the fire. Directly you do that you will find the valve fly open and keep open, and never fail. Mr. Hoskins, some few years ago, sent for him in a violent hurry, because the smoke came out of a ventilator which would not act. When he entered his office he found the register door thrown altogether back, and the chimney was being filled with air from over the fire. He put the register in its proper place; that instant the ventilator flew open; and if that one point be attended to—viz., the taking care that the throat of the chimney is contracted, the valve can never fail. When the smoke is abundant—when the fire is first lighted for instance—the register can be opened a little more. The register should be graduated, a flue being 14 in. by 9 in., has an area of 126 square inches; and if you have a register 9 in. by 3 in., there is only about 27 inches left for the smoke to escape, you thus create a vacuum, and the moment you create a vacuum the air will rush in through the ventilator. [Mr. Seddon said that he thought it would do so if there be a supply of fresh air to the room, but not otherwise.] Mr. EDWARDS.—It would not do to put a register to many stoves, because they are so open above the fire, hence the action would fail. At Mr. Hoskins's house, in Woburn-square, he had two openings to admit the outer air, one on each side of the fire-place. [Mr. SEDDON.—You may feed the fire in that way, and the room may be the worse ventilated for it, because the foul air, not being drawn off to supply the fire, remains in the room]. Mr. EDWARDS.—If you supply a certain amount of air, and you have a register you can command, you cannot fail. [A MEMBER.—Can Mr. Edwards give us some means for preventing soot coming down?] Mr. EDWARDS.—One means is to keep the chimney clean. [THE MEMBER.—You cannot do it, you cannot sweep it every day or hour.] Mr. EDWARDS.—If you adopt this means of contraction you will not find the soot, but you will find the particles of dust collected around the head of the valve, shewing the air has been streaming into it, and bringing dust with it, but you will not find dust going back. These two points are absolutely necessary to attend to a supply of air, and a proper contraction of the throat of the chimney; by securing them you will never fail. There is, however, another thing should be attended to. It is often the case for persons to put up a chimney pot 8 or 9 in. in diameter. The chimney pot should be as large as possible. If the flue is 14 in. by 9 in., and you reduce it at the top to 8 or 9 in., it is putting a damper upon the top of a chimney. Let the chimney be as large as possible, and I vouch you will never have any inconvenience. As for Dr. Arnott's valves requiring oiling, that is altogether an error. You will find, if these valves are well made, they never require oiling, and will keep in action for many years. [Mr. HAYWOOD asked if he could be referred to any house where they are in that state of action?]

Mr. CHARLES FORSTER HAYWARD, Hon. Sec., said he should have pleasure in shewing Mr. Haywood an instance in his own office. The walls having been stripped for repapering, he found one of Arnott's valves, which had been papered over. Thinking it was one of those horrid things that only let the smoke in, he was inclined to paper it over again. However, he had the valve cleaned, regulated the balance, and the valve has worked very well ever since, and without any down draught of smoke or dust. It is inserted in the same flue which serves the fire-place of the room. Although it appeared his predecessor found some inconvenience from it, or else it would not have been papered over, he could only say if he had known of its value before he should certainly have used it. The stove, an ordinary register, rather large, was not altered, or the arrangement of the room in the slightest degree. It was, he thought, a great pity that any gentleman having an invention, or any particular notion with regard to ventilation, or anything else, however good it might be, should urge it to such an extent, as if it were fit for every circumstance, and suitable to every case. Ventilating doctors should be very careful not to push their particular inventions too far, and place them in positions for which they are not fitted. There is an individuality, so to speak, in rooms and chimneys, and an external variation in atmospheric conditions, and, therefore, what would suit one set of circumstances would fail in another. There is no difficulty whatever in obtaining genuine testimonials in favour of different systems of ventilation. The inventors do not tell us of those instances in which their system may have failed. One must use one's own judgment in each individual case to see in what way one can apply the particular invention, or systems, sought to be made use of under the peculiar circumstances of the case. He knew of instances where Watson's ventilators have been successfully used in several quite large houses lately. In large houses, or public rooms, where there are a good many occupants, and their object is to ventilate the house in a mass, they seem to answer very well, but he did not think it would answer on a small scale so well. Because we see a model work well, we are not bound to infer that the system will work on a large scale. For, in a model, the atmosphere, if not entirely uniform, or nearly so, is under control, while that of a house and the exterior atmosphere are often very different, and cannot easily be managed together, so that often the whole working of a good ventilator is suddenly and temporarily reversed. What answers at one hour of the evening will not succeed so well at another, perhaps, because of the difference between the temperature outside and in the rooms at different hours. He should fear that this difference of temperature would seriously affect M'Kinnell's ventilator, causing it to act at times in a manner which would not be perfectly satisfactory. He did not say this from any experience of this particular plan, but from ventilators fixed in his own room, and elsewhere, which answer admirably generally, and whenever there is no storm of wind or rain; but whenever the atmosphere is seriously disturbed, he was obliged to shut off the ventilation, and get the air from the staircase, or other air reservoirs, by opening doors.

THE CHAIRMAN said he was happy to find the tone which the discussion had taken; it was the mutual communication of practical experience without any attempt at antagonism. He had now in his eye a gentleman, Mr. Rosser, who is the successor of the ablest authority on the subject, the late John Sylvester, whose name would be familiar to all. Perhaps, he would kindly favour the meeting with a few remarks.

Mr. ROSSER said he should be very glad to contribute anything in his power that had come within his own observation. With reference to Watson's ventilator, he would remark upon a point not touched upon that evening, which, perhaps, might help gentlemen in their practice. There is no doubt that, under certain conditions, Watson's ventilator may be relied upon, but the conditions under which its success must be expected ought to be known. The success of the experiment, made with such models as they saw, depended upon the space to be ventilated being hermetically sealed as regards all other openings, except the ventilator. If there is no division in the chimney for the exit and entrance of the air, the exit of the interior air, and the entrance of fresh air from the exterior, will be intermittent, and there will be a slight movement forward at one time and backward at another. But if you take a slip of paper, and drop it in to the upright chimney, and thus divide it into two parts, something similar to the brattice in a mine, so soon will you get a good ventilator. The influence of the wind has a great deal to do with it. In Muir's ventilator, if the wind blows upon one or two of its faces, it will be deflected down into the apartment. That is sometimes inconvenient, and produces a strong draught, and if there are any strong fires burning there will be a descending current, probably without any corresponding exit up the other two ducts. So in Watson's, if the wind blows against one side of the division, it will descend into the room; and there may, or may not, be an up-draught on the other side, according to circumstances. He had tried that experiment, in a simple way, for the purpose of drying bottles. He noticed in the kitchen that if bottles had been washed, and they were made hot to dry, drops of water would remain inside for hours. But if a slip of paper were dropped in the neck, the cold air would go down one side of the paper, and the warm air will come up at the other side, and the moisture will soon be evaporated. But that, however, is not the condition of a room which has openings, such as doors and windows. In that case, the room would be like a bottle with a hole in the bottom of it; and there would be a current wholly up as long as there is a hole in the bottom, if the temperature is maintained at a higher point than that of the external air. So in reference to Watson's ventilator, and others of that class, you never can say what the current will be, whether upwards or downwards. It will depend entirely upon the circumstances of the room itself. A Watson's ventilator might, perhaps, deliver cold air into the room, which would be carried out by the draught of the chimney.

Mr. A. J. BAKER, Associate.—Several gentlemen had this evening stated their experience in matters of ventilation, he would, therefore, offer the results of his practice. It had been questioned whether an Arnott's ventilator should be fixed in any other flue than that of the fire-place of the room; he had tried this experiment, but could not recommend its adoption, as in the absence of other inlets for fresh air the current came downwards to feed the fire and caused a constant flapping of the valve. He wished that Dr. Arnott had been present this evening to describe the principles of his ventilator, as he would have elucidated the subject in his own agreeable manner. Dr. Arnott had clearly explained that for the efficient action of his ventilator it was necessary that no large amount of cold air should be allowed to go up the chimney with the smoke, as was the case when a large opening was left above the fire in the smoke consuming fire-place which he invented. Dr. Arnott had placed the hood immediately over the burning coal, and the smoke was carried away by a pipe of 4 inches diameter, and even this had to be partially closed by a damper when the fire was strong; it would be apparent that if so small an opening carried off all the smoke, the draught must be very strong, and in this case the Arnott ventilator acted extremely well. If smoke-consuming stoves were generally adopted they would prove a remedy for the evil of the return of soot. With regard to the inlet of fresh air, he had tried various experiments. In a bedroom he had placed an ordinary sliding ventilator, communicating with the external air, under the bed, and had found it perfectly unobjectionable. Dr. Arnott had used the same means in a large dormitory of a school in Camden Town, and had recommended the plan, and he could bear testimony to its success; there was not the slightest annoyance from cold, while it always preserved a certain freshness in the room, so as never to become disagreeable or unhealthy. He had also tried admitting fresh air midway up the height of the room, by a vertical tube, the lower end of which was supplied with fresh air from outside, which was thus brought into the room in an upward direction; this proved as efficacious as the former plan, the only drawback being the noise caused by the wind in the pipe. Then there was the Sheringham ventilator, fixed near the ceiling; the principal objection to which was the blowing in of blacks and dust, but this could be obviated by covering the opening with perforated zinc, which also had the effect of softening the current. By bringing in fresh air at the top of the room it became somewhat warmed by the heat accumulated at that part. He could not agree that the warm air at the top of a room must necessarily be the foulest, for foul air is specifically heavier than fresh—the emanations from our bodies, and the products of combustion, ascend to the top of the room, not because they are foul, but because they are warm; if, therefore, a current of cool fresh air could be brought in at the top of a room, to rob the foul air of its warmth, the latter would, by its greater weight, descend to the floor and be carried away by the draught of the fire. The good effects of perforated zinc in softening draughts of air were evinced in omnibuses, in which much less inconvenience was experienced than when a mere gap, or louvre, admitted a sharp current behind our heads. The advantage was still greater when there was a double arrangement of perforated zinc. A physician, who wished to ventilate an ordinary dwelling-house, which was to be used as an asylum for a large number of inmates—a case usually involving considerable difficulty—simply introduced double perforated zinc, instead of glass, in one of the upper panes of a window in each room; formed a panel of perforated zinc over each internal door, and carried up a shaft from the top of the staircase through the roof for the exit of foul air, and, by these inexpensive means, without any annoyance to the inmates, he has effectually accomplished his object. The inlet at the top of the room, if protected with perforated zinc, he considered altogether by far the most agreeable.

Mr. W. Haywood, Fellow, said that he rose to offer a few remarks about Arnott's ventilator, which he considered the best means yet adopted of ventilating. He believed that ninety-nine out of one hundred such ventilators did occasionally admit smoke and soot; but he did not believe a more perfect self-acting thing than Arnott's ventilator could be got. It is constructed upon a perfect principle, and the good must be taken with the evil. He did not believe there is any real difficulty in getting rid of the hot air, which is the most vitiated air, although the gases which constitute the vitiated air are, in their concentrated state, he believed, specifically heavier than pure air. The whole and sole difficulty in ventilating is in bringing in the fresh air. Any system which introduces it at the top of the room is an error. You cannot bring in cold air from the top without its coming down like a douche. If the air is relatively cold, it begins immediately to descend like a douche of cold water, and only loses its force when it is mingled with air of a greater heat, and lost its original temperature. If you bring in hot air, it is questionable if you can admit it without inconvenience at the level of the head. But what is comfortable hot air? You may bring in air at a temperature of 66 degrees—and no air ought to be brought in of much greater heat than that; but if you bring in air at that fitting temperature, nine people out of ten, at this time of the year, will say, " How cold the air is!" or, " What a draught there is!" You never can ventilate a room to please everybody. The most marvellous system of ventilation ever devised, in my opinion, was that for ventilating the Houses of Parliament, by Dr. Reid; and those who go through the parliamentary papers and other works upon the subject, and looking at the thing dispassionately, will see that the plan was the work of a very great man—of a philosopher. Somehow or other, Dr. Reid got to loggerheads with the architect, and it is now, and was, perhaps, then, impossible to say which was at fault—perhaps both; but, at any rate, Dr. Reid's system is to a very large extent in operation in the Houses of Parliament at the present day. The mode by which the air is purified and cooled by jets of water is in operation every summer. The existing system is worthy of the attention of every member here, who will have no difficulty in getting to see it, and it was, he believed, for the greatest part, Dr. Reid's system. The large fan put up by Dr. Reid has been discontinued; but the fan was only the means of passing air quickly. Some argue that the fan is far cheaper than a simple furnace; others, that the furnace is the cheapest. The furnace is now alone used at the Houses of Parliament. The ventilating operation, of which Mr. Tite had told them to-night, is well managed. The members of the House sit over large air chambers, and the air is introduced to the rooms by small holes in the floor, which holes are practically made smaller by a horsehair carpet, which covers them, and through which the air freely oozes, without any perceptible motion, and so that scarcely anybody would say there was the slightest draught. Now a system that will ventilate all the rooms and corridors, which are at all levels, and of all sizes, and subject to all sorts of disturbing influences in so large a building—and I think that is done at the Houses of Parliament—is a great credit to him who designed it; and he therefore said that great credit was due to Dr. Reid. He advised all to go and see the system; it can be inspected in two hours. They had better take their overcoats, however, for, in summer, there are cold or draughty chambers in which they would require them. He had been called in to advise upon the ventilation of a large club, principally in relation to the water-closets, &c. He would tell them an incident which occurred to him there. He found the urinals as sweet as could be expected, considering the temperature maintained, which was high. He said, " This is too high a temperature for the closets." " Oh," said one of the officers, " the old gentlemen say it is not nearly warm enough! We had increased ventilation at one time, and there was so much objection about it, that we were obliged to alter again." He suggested that some additional ventilation should be made, and that the temperature should be kept down to sixty degrees at the highest. He was there one morning, standing in the corridor with an assistant, when in came an old gentleman, and one of the employés said, " We are considering the subject of the ventilation of the closets." " Well," said the member, " I hope you will stop these infernal draughts." Afterwards, in came a fine athletic fellow, and he said, " What are you doing there?" It was replied, " Considering the ventilation." He said, " Why don't you open the windows?" I am telling you facts. He found that the system of ventilation throughout the house had been designed by an accomplished architect; it had been very carefully considered, but it was an utter impossibility to please all the people. He believed that would apply to every system of ventilation in every place you can name. He said, therefore, that all a professional man can do, when called in to design a system of ventilation, will be to please himself; and if he has managed to maintain the rooms in a building with a tolerably easy current of air, at a proper temperature, that is all he can do; and if he pleases one-tenth of those who occupy the room, he will be a very fortunate man. No man, however strong and well he may be, can stand the same amount of heat comfortably at one period of the day that he can at another. Take yourselves. Before breakfast you are mostly chilly, but not at all so afterwards. In the evening, if you have had a good dinner, and are in a state of repletion, you are great caloric engines yourselves; that is the time when most people complain of the heat in rooms, and yet when few people will submit to the least draught, and it is the period when ventilation is most complained of. Those persons who happen to be in a most comfortable corner of a room ventilated upon any principle, will, directly they feel a little warm, sing out for more air; and those persons near the fresh air inlets will say they are cold, directly fresh air is admitted. He knew of a large building, which is admirably ventilated, and in one of the principal rooms of which the air comes through perforations in the doors, and near to the doors, although the members do not seem to be aware of it. Of all the places to let in the air, the door is about the best, and for this reason—that very few persons will sit near a door—although, of course, uniform diffusion of the fresh air is the best, and the more diffused, the better it is; but such refinement of distribution cannot be carried out in the majority of buildings. Now, upon ordinary occasions, that room is tolerably comfortable, but, upon extraordinary occasions, when the room is full, the air is unbearable. When he was asked to remedy that state of things, he found it could only be remedied at a very great expense, although it was certainly capable of improvement; and, in his opinion, in similar cases, it is better to submit to occasional inconveniences, than provide against them at the risk of deranging that which is tolerably satisfactory upon most occasions. This room was under the control of one man. When he went in one day, he said, " Why, you have got all the fresh air inlets closed." He replied, " There have been members here complaining that the room was cold; and what am I to do?" Now, what is to be done under such circumstances? Perforated zinc panes had been spoken of. Now, my opinion was asked about the ventilation of a college. In some of the windows they had put in perforated zinc panes, and the boys had hung their clothes and other things over these panes to keep out the cold air. He had now alluded to some of the difficulties in the way of any system of ventilation, and would again remark that any one who undertakes to ventilate, must dismiss all hope of pleasing any one but himself. There are two fundamental principles in ventilation, which he believed can never be departed from—that is, the hot air should go out at the highest point, and that the cool or fresh air should come up from the lowest point. He thought, of all the systems, Arnott's is the best for small rooms, and it is the cheapest. The utility of the thing commends itself at once, and it only requires to be allowed to act without interference, and the occasional descent of smoke and smut to be submitted to patiently; for, upon the whole, I believe less inconvenience results from their use than from any other apparatus. I speak, of course, here of rooms in ordinary houses.

Mr. HAYWARD, Visitor.—As manufacturer of Sheringham's ventilator, which admits the air at the top of the room, has been spoken of, and as I have had some experience with them, I am bound to say that, when they have failed, it is through their not having been placed in a proper position. If they are placed within two or three inches of the ceiling, then the air is driven upwards to the ceiling, and descends afterwards into the room to a considerable distance. Air has a tendency to cling to anything with which it comes in contact; and it slips between the hot air of the room and the ceiling, and thus a constant supply of air is obtained. If the ventilator be placed in the wall, a foot from the ceiling, then I agree with Mr. Haywood that the air will immediately fall as it comes in. This I have proved. As far as Arnott's ventilator is concerned, where the two are in conjunction, I have found you do not get the blacks as you would otherwise, and the opening to admit the air should be double the size of that for its egress. As for getting rid of the blacks altogether, that, I think, we cannot do.

Mr. MARRABLE being called upon to reply, said he had not much to say in reply, excepting in regard to Arnott's ventilators. He had tried them. Mr. Edwards fixed two for him. They sometimes let the foul air out, but they much more often let the blacks in. They also kept up a continual flopping. He always found, if they were left open—that is, if he did not pull the cord to fix them—when the smoke became condensed during the night, there was a great irruption of blacks in the morning. The sofa, or other pieces of furniture that stood under the ventilator, were sure to be covered with them. In a very little time, these ventilators became fixed, and their nuisance was greater than their utility. With regard to the practical difficulties of carrying out any scientific system of ventilation, he quite admitted them, and that was one reason for his wishing to find out whether there was any self-acting apparatus, that could not be interrupted by the want of attention of the servants, or by the over-attention of the wind. At the offices of the Metropolitan Board of Works, lately built by him in Spring Gardens, he took considerable trouble to ventilate and warm the large room. He thought he had succeeded—and while it was under his own supervision, it did succeed. Generally speaking, it gave satisfaction. Some time after he retired from the Board, very serious complaints were made of the warmth not being sufficient, and the ventilation being bad. Cold draughts were drawn down, so that the members could not sit in the room unless attired in great coats. A committee was called on the subject, and he was requested to attend. He did so. He took the trouble to see what was the fact, and he found the provisions for ventilation were not only disregarded, but positively destroyed. Mr. Marrable gave a drawing of the room, from which it appeared that the air-chamber was underneath the room, and that there were several windows in it. In the centre of the floor were large gratings, over which stood the general table for business; and that was intended sufficiently to disperse the air as it was admitted. Under this grating was a warming apparatus on Gurney's principle, having a double set of batteries, and the windows were always to be opened to admit a thorough current of fresh air in the chambers below, which could only be admitted into the Board-room by passing through these warming batteries, there being a piece of ship's canvas hung round, so that all the air was directed through these batteries before it came out into the room. There was a sunlight in the ceiling, which, as it passed through the roof, was provided with a circlet of gas-jets in the outer tube, to insure an upward current when the sunlight was not in use, before going into the air-chamber below. He found it had been used as a lumber-room; and there were, at least, twenty cart loads of old books, old tables, step-ladders, desks, &c.; in fact, all the old fittings from Greek Street had been put in there, and the dust had been allowed to accumulate. He then looked at the sunlight. It was not burning, and he asked the man who had the charge of the room, if he did not keep it alight when the members were sitting. He replied, "No! it burns so much gas. It burns 100 feet of gas in an hour." He gave directions that the air-chamber should be cleared of the lumber, and afterwards, when the committee met, he took them into the room, and they were quite satisfied with it. He told them they must keep the gas in the ventilator alight while the board was sitting, if they wanted ventilation. Since then he believed the ventilation has been pretty good. Some of the members could not agree about the warmth of the room, so he suggested an auxiliary apparatus. He told them that with one apparatus he could not always keep their room at an agreeable temperature, whether in winter or summer. In the same building he made a trial of ventilation in the Committee-room. For that purpose he had tubes in the ceiling (bressamers or girders in appearance), the soffits of which were filled in with perforated panels of zinc. The tubes run along the ceiling, communicating with air flues in the wall. He had a set of gas jets burning in the upper part of this flue, behind an iron door. He tried how this ventilation acted by filling the room with smoke. He then lit the gas, and found the smoke pouring out in volumes, and in ten minutes the room was free; the experiment answered perfectly. He had since made enquiries, but found that the gas in the upper part of the air shaft is never lighted, and, consequently, his apparatus is inoperative.

The Discussion was then adjourned to that day three weeks.

THE ABBEY CHURCHES AT CAEN.

EXPLANATION OF THE ENGRAVINGS.

FRONTISPIECE. Bird's-eye View of St. Stephen's Abbey in 1684, from the *Monasticon Gallicanum.*

FIG. 1. Plan of the Romanesque portions of St. Stephen's Church, at the level of the Clear-story.

2. Primitive Masonry with wide joints and the mortar projecting, in the part (*a*) markedblack in the plan.

3. Masonry of the second period with moderate joints, in the part shaded (*b*) in the plan.

4. Fine-jointed Masonry, slightly overlaid with mortar to imitate the larger joints of the previous periods; this masonry belongs to the same period as the vault.

5. Section of the Clear-story Passage, in its present state.

6. Part of the wall of a Chamber in one of the Western Towers, at the level of the Triforium, and at the corner next the Staircase, shewing some of the primitive masonry built against and partly concealed by that of the second period.

7. The same angle of the chamber above, at the level of the Clear-story.

8. Angle of the same chamber, with the entrance to the Gallery, or Passage, in the Clear-story. In these three engravings the primitive parts are represented by the darker tint.

9. Bay of the South Aisle of the Nave next the Transept. This bay shews marks of an arrangement of the Triforium, which M. Bouet considers to have been afterwards abandoned in the remainder of the building.

10. The two Upper Stories of the West Bay, in their original state, shewing the two chambers from which Nos. 6, 7, and 8 are taken. The upper arch has been entirely altered at the time of the insertion of the Vault.

11. Original arrangement of the Clear-story of the Transept, according to M. Ruprich-Robert.

12. Original arrangement of the same, according to M. Bouet.

13. Plan of half a bay of the Clear-story of the Nave; the original portions in the darker tint, according to M. Ruprich-Robert, which in this instance is nearly identical with M. Bouet's plan.

14. Ground-plan of West Front and Towers.

15. Plan of the North-west Tower at the level of the Clear-story. The primitive portions are black, those of the second period are tinted. Nos. 7 and 8 are taken from this chamber.

16. Clear-story of the Nave in its present state, with the Vault, and indications of the old arrangement.

17. Clear-story of the Transept, shewing the present construction, and indicating in dotted lines the original arrangement according to M. Bouet. (The capitals in this and in No. 12 are made to appear rather too Gothic.) This design differs considerably from that of

M. Ruprich-Robert, No. 11. M. Robert shews pilasters attached to the wall where M. Bouet has detached shafts; M. Bouet has found one of these in its place, enveloped in masonry of the twelfth century.

FIG. 18. Bird's-eye View of the Nave of the Abbey Church of Cérisy, according to M. Bouet.

19, 20, 21, 22. Elevations and Sections of the Nave, according to M. Ruprich-Robert, which differ in some respects from the more careful researches of M. Bouet, but suffice to give a good general idea of the changes in the fabric.

23. Embattled fret ornament, the same as that introduced round the windows at the period of the Vault.

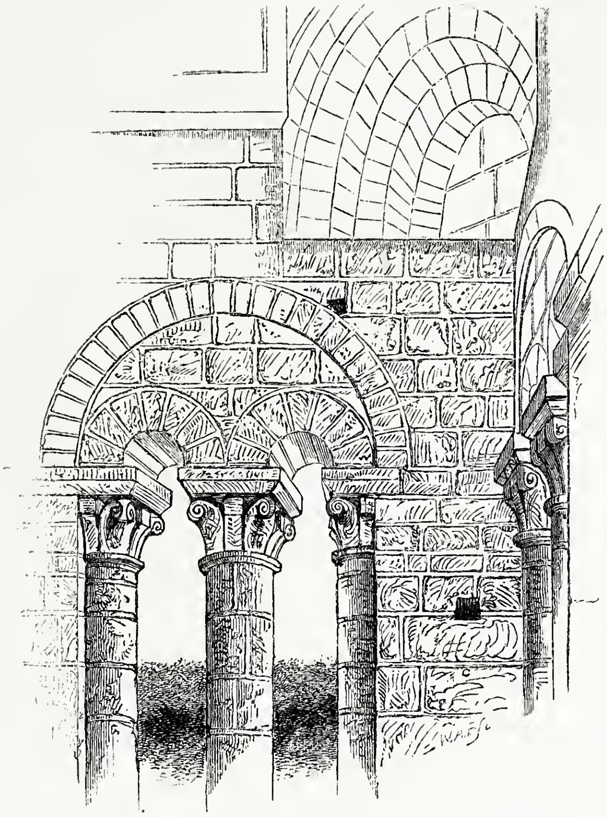
24. Hall of the Guards, marked 17 in the general Bird's-eye View. (This drawing has been reversed in the engraving.)

25. Turret of the Tribunal, or *Officialité*. (Marked No. 24 in the General View: at the time that view was made this curious old building was intended to have been rebuilt, and its place is represented as occupied by a modern building, designed but not executed.)

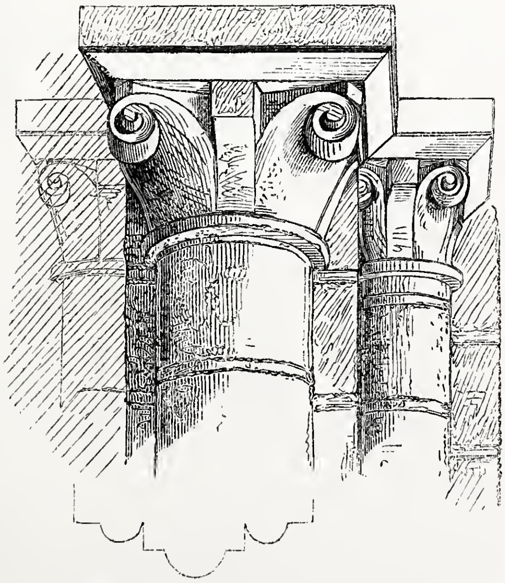
26. Capital from the Belfry Story of the South-west Tower of St. Stephen's, shewing the rude Ionic form of capital, and the junction of the masonry of the Romanesque tower with the Gothic spire.

27. Capital from the Church of St. Nicolas at Caen, shewing the identity of form; and as this *cannot be earlier* than 1083, and may very probably be ten years later, it agrees with the date assigned to the second period at St. Stephen's.

28. View of the West Front of St. Stephen's Church.



26. Capital, &c. from the Belfry Story of the South-west Tower, St. Stephen's, Caen.



27. Capital from the Church of St. Nicolas, Caen.

SOME PRACTICAL REMARKS ON THE VENTILATION OF DWELLING HOUSES,

By Messrs. F. EDWARDS and SON.

IN the few observations we have to make on the Ventilation of Dwelling Houses, we wish to point out what we have found by practical experience to be the best means for withdrawing the vitiated air from apartments, and for giving a sufficient supply of fresh air without the inconvenience of draughts. We regard the adoption of an efficient system of ventilation, the effectual and economical warming of rooms, and the prevention of smoky chimneys, to be so intimately associated and dependent one on the other, that it is exceedingly desirable the leading principles, by which such objects can be obtained, should be made known as widely as possible.

These principles we believe to be as follows :—

1. The withdrawal of the vitiated air from the upper part of the room before it can return to be inhaled by the inmates.
2. The contraction of fire-places, and the use of properly made registers or dampers.
3. The introduction of a channel to give an independent supply of air to the fire.
4. The use of valves over the door, or in an external wall near the ceiling, to give a supply of fresh air to the room.
5. That free egress should be given to smoke at the top of chimneys, and, when necessary, that down draught should be prevented by simply-constructed windguards.

With respect to the first point, we regard the soundness of the principle of withdrawing the vitiated air from the upper part of a room, before it can return to be inhaled by the inmates, to have been so thoroughly established in the writings of Dr. Arnott and others, and by the adhesion of every scientific man of note with whom we have come in contact during the last twenty years, that it is unnecessary for us to say anything in its support. The principal plans that have been proposed to effect this object have been :—1. Dr. Arnott's Ventilator. 2. Double Flues, in which the same principle is involved and which give a separate passage to the vitiated air to that for carrying off the smoke and heat from the fire ; and, 3. The Inverted Syphon principle now nearly exploded.

Dr. Arnott's Ventilator was originally hailed by the scientific world as a valuable invention. It is applicable at so small a cost, and is so effective in withdrawing vitiated air when properly made, and when the simple conditions necessary for its success are attended to, that many will be interested to know whether or not the inconveniences that have resulted in many cases from its use are capable of being removed. As the original producers of the Ventilator, we will shortly state what has been our experience of the matter. It is well known that Dr. Arnott never patented any of his inventions, and has never profited by them in a pecuniary sense. While this was calculated to give the public the advantage arising from competition between manufacturers, it had unfortunately the tendency to defeat the principal object in view, most manufacturers having produced an article called an Arnott's Ventilator, but which, for reasons we will explain, the Doctor has always condemned.

The ventilator we first produced had the hinges and weight to balance the flap on the side of the ventilator facing the room, so that its working might not be impeded by soot falling from the chimney.

It was carefully balanced so that a slight pressure of air from the room would open it, and that a down current of air would close it, but without the flap vibrating. This is the only ventilator Dr. Arnott has ever used or recommended; great numbers have been put up with success, and if very ordinary care were used in erecting it, there is no reason why it should not work well for a very considerable time. The public, however, generally objected to this ventilator from its unsightliness, and we thereupon produced one with the balance flap suspended in the inside, by means of a lead weight along the top. The action of the flap was thus reversed, the object being to place the hinges out of reach of the soot and blacks falling from the chimney. This ventilator, when properly made, we have also found to work well. The great majority of those, however, which have been made during the last fourteen years have had the balance flap suspended inside the ventilator but from the bottom, the consequence being, that soot falling from the chimney has quickly impeded the action, allowing smoke and blacks to enter the room whenever there was a gust of wind down the chimney. In addition to this, the principle of the ventilator has often been so little understood, or so little care has been taken in the manufacture, that instead of the balance flap being made to open with a breath of air, and to return slowly but surely to a closed position, it has been made apparently on the principle of making as many vibrations as possible per minute, and not to close perfectly at all. To say the truth, it has but too frequently been made on the principle of production at the lowest possible prime cost, and to allow as large a discount as possible to builders.

There is another point which absolutely requires attention for the purpose of securing the effectual working of the ventilator, viz., the contraction of the fire-place. As this promotes the effectual warming of rooms, and the neglect of it frequently occasions the nuisance of a smoky chimney, its advantages cannot be too strongly insisted upon. A register door or damper should be provided in all cases, which should be opened as much as is necessary to let the smoke escape, and no more. In a fire-place that has not been contracted, the chimney is sure to contain a considerable amount of cold air, the heated air and smoke ascend with a small velocity, and are consequently subject to be driven back or through the ventilator by a very slight disturbing cause, such as the opening or closing of a door. If, however, a suitable register or damper is used, and the fire-place is properly contracted, a very small amount of cold air will enter the chimney; a column of heated air will pass up the chimney from the fire without being disturbed by currents; the air in the chimney will be very rarefied, and the vitiated air will, by a simple law of nature, pass through the ventilator and escape from the room.

In the interesting Report on the Warming and Ventilation of Dwellings, printed in 1857 by order of the House of Commons, the following observations occur:—"The Commission strongly recommend that the fire-grate should be studied in its construction with the view to its effecting a better and more economical consumption of fuel, and a more equal distribution of heat, and not as a contrivance for the ventilation of rooms. The Commission is decidedly of opinion that so long as the fire-grate is studied with a view to this two-fold application, it will not succeed well in the performance of either." With this and most of the other recommendations contained in that Report we cordially concur.

We sometime since turned our attention to the production of an improved form of chimney bar, which might enable a chimney to be formed of proper dimensions at the chimney opening, dispensing with the large open space over a fire-place. It will be at once evident that if chimneys can be built with the throat effectually contracted instead of this being left to be imperfectly carried out or entirely neglected when the grate is fixed, a sensible improvement is effected. A second advantage arising from this is, that no place whatever is left for a lodgment of soot in the chimney. We have known architects to adopt other plans to effect the same object, but we would strongly urge that it should be effected by one means or another in all rooms except kitchens.

If, in addition to the properly made ventilator and the contracted fire-place, a supply of fresh air is given to close rooms, and proper egress is given for the smoke at the top of the chimney (things that contribute to the effectual warming of rooms, and the prevention of smoke as well as the carrying out a perfect system of ventilation), we have no hesitation in stating that the Arnott Ventilator would be found to be invariably successful.

2. As the system of Double Flues is applicable only to new dwellings, and involves an entire change in the construction of chimneys, we will not attempt any discussion of the various plans that have been proposed, but will simply point out that as the air heated by contact with a smoke flue is not nearly so rarefied as the ascending air in the flue, any such plan must necessarily be less effectual than the Arnott's Ventilator. The system of Double Flues is recommended in the Report already referred to, and we would respectfully suggest that if it should be considered by many members of the architectural profession that it is desirable to carry out some such plan for new buildings, their views might be materially promoted by a discussion being held on this particular subject. Manufacturers have little inducement to produce the articles necessary for such an object, unless they see a probability of their somewhat extensive adoption.

3. With respect to the Inverted Syphon system, which consisted in fixing a tube in the breast of the chimney with the top end opening into the room and the lower end opening into the chimney, the following observations occur in Dr. Arnott's last work on "Warming and Ventilation":—"To manage aright a descending flue, for whatever purpose used, is proof of a certain degree of skill in pneumatics, but a man who, without such knowledge, meddles with the arrangement, is almost sure to exhibit his deficiency. A strange instance of this kind took place two or three years ago, in the case of a patent taken out by a Doctor for a so-called 'Inverted Syphon Ventilator.' The deluded patentee believed he had discovered a new principle in nature, namely, that a bent tube had a power, by virtue of the bend itself, of giving motion to the air contained within it. Singularly, however, he missed seeing that if this were true, he had solved the problem of the perpetual motion." It may well be asked, if the air is to be drawn from the upper part of a room into a chimney by first being made to descend several feet in a small tube, what is this but the Arnott Ventilator principle carried out in a very ineffective and expensive manner.

With respect to the introduction of fresh air into apartments, most cogent proofs of the advantages resulting from giving the fire an independent supply are furnished in the Report we have already alluded to. The extensive series of experiments on which that Report was based took place at the Wellington Barracks. Four rooms were selected, measuring thirty-three feet by twenty, and four different grates were erected by different manufacturers. In one we were invited to fix one of Dr. Arnott's Smoke Consuming Grates, and with the permission of the Committee we formed a channel for the supply of air to the fire. The results of the experiments are given in page 91 of that Report, where the following observations occur. "The floor of that room was the warmest in which an air channel was led from the external air to supply the fire with oxygen, and the temperature of that room was the most equable. An air channel to every room to admit air, first leading it behind the stove so that it shall be warmed before it enters the room, is strongly to be recommended. This would go far towards keeping the floor and walls warm." The details of the experiments are most amply given in the Report, and will be found summed up on pages 84 to 86. We need say nothing further of the advantages arising from the air channel, but will observe that having frequently made the air to pass round the back of the grate so as to enter the room warmed, we think the expense attending this and the care required in fixing to be an objection to its ordinary use. We have, however, devised another plan which, we think, obviates these difficulties. We have produced a hearth-plate in cast-iron, with a chamber below for the entrance of fresh air which can be made to pass into it from the direction most convenient by means of a communication between the joists with an external wall. The sliding valve should be underneath the bottom plate of the fender. The air is arrested in its passage so as to be warmed in passing through the heated chamber below the hearth-plate, and could consequently cause no inconvenience from draught. We do not think, however, that the hearth-plate is sufficient to supply fresh air both for combustion and respiration, and in the summer time it would operate but feebly. We therefore recommend the adoption of two methods, viz., that a channel should be conveyed from the outside, conveying air into the room near the grate, and that sliding valves with layers of perforated zinc should be fixed over the door or in an external wall, near the ceiling. Sheringham Ventilators we recommend for very large rooms, and for staircases and passages.

In most cases, when a supply of fresh air is made to pass round the back of the grate, ingress is given for it to the room by means of sliding valves in the upper part of the grate. In the plan we carried out, however, for Professor Hosking many years ago, the openings for admission of fresh air were at the bottom of the cheeks near to the fire. By the first system a room is supplied with fresh warm air; by the second the chief object is to supply the fire and prevent draughts. A plan that has been lately proposed is to give a supply of cold air directly under the fire. This, though apparently differing but little from Professor Hosking's plan, would generally be found very objectionable. It is certainly calculated to make a fire burn very briskly, but the only economical and steadily burning fires we have ever known, have a less supply of air than usual given from underneath.

Should any gentleman wish to make further investigation into the subject, we would recommend a perusal of the Report on the Warming and Ventilation of Dwellings, of Dr. Arnott's last work on Warming and Ventilation, and of such of Count Rumford's Essays as are devoted to "Chimney fire-places."

FREDK. EDWARDS & SON.

49, Great Marlborough Street, London,
March 25th, 1863.

ON ARTIFICIAL STONE.

By Robert Kerr, Fellow, Professor, King's College.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, Feb. 23rd, 1863.

We have met to enquire into a scientific problem of a very interesting kind; and I venture to open the enquiry, not on any pretension to particular acquaintance with the matter practically, but rather because I am so strongly impressed with respect for the ingenuity which has recently been brought to bear upon it.

Let us begin by looking for a moment at the state of things in very ancient times. Blocks of stone, as we know, were skilfully quarried from the rock, neatly shaped with the tool, and built up in correct and substantial structure with joints of mortar, three thousand years ago. I refer, of course, to Egypt. The stone was generally freestone, and the mortar, I believe, lime and sand, both like our own; the materials were of the best, and the workmanship of the best.

But again, stone and lime mortar could not be everywhere obtained; and upon the plains of Assyria, for example, and even in the lower lands of Egypt itself, substitutes had to be accepted for both. Instead of stone there was brick—perhaps the more ancient material of the two; instead of lime and mortar there was clay and bitumen—both doubtless more ancient than burnt lime. Common work was built of brick sun-dried, cemented with clay; superior work of brick fire burnt, cemented with bitumen. The object of these remarks, however, is simply to enable us to note this point once for all, (self-evident upon a moment's reflection,) that brick, from that day to the present, has never taken the position of an artificial stone; its most refined form, terra cotta, being still of the original brick type, a material of different class. We may, therefore, exclude brick altogether from our enquiry.

Now, what is lime mortar? The answer in the most scientific form is the most simple answer; it is artificial stone. For mere adhesion, the most primitive cement was clay; the improvement upon this was the preference of bitumen; no doubt the most primitive works of stone walling would be cemented with clay. But it was a more ingenious idea that brought lime mortar into use. It was the application of a discovery which, probably at the time, took such a form as this; that a certain stone could be burnt in the fire, and that out of its ashes stone could be again made. As to the scientific question, the mind was easily satisfied in those days; and the practical material was looked at just as we look at it, stone it had been, and stone it came to be again, and the use of it was plain. It furnished cement for the builder, to secure his stones together, and plaster to cover rough work and make it smooth.

The next step that interests us was the invention of concrete. There is no reason affecting our present purpose to look at this material as other than one of the many improvements in building effected by the Romans. One might say the purpose of concrete is so simple a question as to need no expounding here; but, on the other hand, there are not wanting such illustrations occasionally of a misconception of that purpose, that we may at least note in a word, to ensure an accurate application of the illustration of this elementary principle, that not only is concrete, however used, *technically* artificial stone, but if it be not (and it too frequently is not) *practically* so—a sound, solid, hard stone-like mass—it is worse than worthless. The scientific description of perfect concrete may be put thus. It is calcareous sandstone magnified in scale. First, there is a conglomeration of pebbles, broken stones, or the like, all in contact with each other; these constitute in a manner the fibre of the structure, very short fibre, but very strong. This is the large ballast. The interstices between these primary particles are occupied by particles of less size, supplied in adjusted quantity so as to fill up between the greater ones by way of supplementary fibres. This is the small ballast. There are spaces still left, but only to be filled up in their turn by still more minute particles, namely, the sand. The sand like the rest is in perfect contact; but there is an articulation of unoccupied space still running through the whole. This is filled up also; and for this purpose we introduce the lime. The lime sets; in process of time indurates; the veins of the substance are at last filled with that which binds the whole together. Not that the lime is the stone; it is but the blood; the stone itself is in the ballast and the sand; to knit together these fibres of strength is all that the lime can do; and, if it exceed this function, it weakens the structure, by encroaching upon the function of the stronger material. In other words, to such extent as lime in excess occupies the place of ballast, to such extent is the concrete of the strength of stucco and not of the strength of stone.

It is scarcely necessary to remind you that this theory of concrete is the theory of all lime mortar; sand wedged together in universal contact, with lime to fill the interstices and no more; clean sand and active lime of course.

Glance now at the structure of natural stone: in other words, before passing to our examination of the substitutes of modern ingenuity—which we must conduct on scientific data—look scientifically at the natural material itself.

Here, it may be also convenient to divest our enquiry of the structural question of concrete, pisé, bêton, and the like; an interesting subject in itself, but quite separable from that of "artificial stone" in the present acceptation of the term, which is a material for ornamental art.

Granites and other less common species of stone we may consider beyond our province, and so confine our attention, in fact, to the two great classes of freestone; the sandstone and limestone of ordinary use.

Sandstone is no more than a concrete of sand: the cementitious element being more or less siliceous (flint-like,) calcareous, (lime-like,) or argillaceous, (clay-like,) according to circumstances. The sand is the strength of the stone, in full accordance with our illustration of mortar. In the best examples it is entirely of quartz or other silica, sometimes adulterated, so to speak, with felspar and limestone grains, but little else; the more complete the contact of the particles, so far the better; the more siliceous, or flint-like the cement, the better; the more argillaceous, or clay-like, the worse; and the more calcareous, obviously the more like our illustration of lime mortar. The stone has been formed by first a deposit of the sand mechanically, and then a deposit, more or less chemically, of the cementing substance throughout its interstices. As instances of the best sandstone let me exhibit, amongst others, the following familar qualities:—

Craigleith, grains quartz, cement calcareo-siliceous.

Darley Dale and Park Spring, grains quartz and felspar, cement argillo-siliceous.

Mansfield, grains siliceous, cement magnesio-calciferous.

Limestone, on the other hand, is concreted on a different principle. In the simple kinds carbonate of lime is deposited in mere chemical form, as the great bulk, if not the whole of the mass; as in the *Chilmark* and *Ham hill* stones, which possess 80 per cent. of carbonate of lime, and the *Barnack*, which has 93½. In the magnesian varieties the principle is the same, the deposit having more or less of carbonate of magnesia in connection with the carbonate of lime, and the more nearly in an equal proportion the better, as in *Bolsover* stone, carb. lime 51, carb. mag. 40. The Dolomite, again, is but the same magnesian limestone rendered crystalline by accidental heat, as at *Mansfield Woodhouse*. We must also note that a small portion of silica seems to improve the stone.

Oolitic limestones, again, as regards the principle of concretion, partake of both the characters set forth. The oviform grains I take to be the disintegrated substance of former limestones, rounded by attrition, and deposited mechanically as sand. The same process of chemical deposit then follows throughout the interstices, as in the case of sandstone; the cement thus formed being, however, carbonate of lime—that is limestone. I need scarcely ask you to look at specimens of *Bath* stone, with its 94½ per cent. in all of carb. lime, and 2½ of carb. magnesia; *Portland*, with 95 and 1¼ of these respectively, and the singular stone of *Ketton* with 92 and 4, its grains being as large and regular, and apparently as uncemented, as the roe of a herring.

Such then are the natural substances which have been commonly employed in ornamental building throughout the whole history of civilization. Looking back once more to our illustration of mortar, we have here on the one hand, in the sandstones, siliceous sand with siliceous cement (more or less pure); on the other hand, in the limestones, calcareous cement with no sand at all; and between the two in the oolites, calcareous sand with calcareous cement.

Now the notion of imitating these materials by means of art is probably entirely modern. We may go farther and say that it is entirely English; and even farther, and call it an idea peculiar to the circumstances of London, and one that must be worked out in London alone; a Cockney idea altogether, some may say, but none the worse for that. If it happens that the great centre of the wealth and enterprise of the present world has somehow been planted, not only on an island at the very extremity of dry land, but on a bed of clay from which all serviceable stone formations might appear to have been studiously removed, the case is most striking. We have built ugly brick houses on this unfavoured spot till the very clay is almost exhausted. We have tried in all sorts of ways all sorts of stone, in spite of the ludicrous *chiaro scuro* of the metropolitan soot. Even if we were not a people who proverbially count the cost and cut off the superfluity, it cannot be denied that for every-day work stone building is inaccessibly extravagant. We have, therefore, taken a dismal comfort in the reflection that, after all, good brick walls make a very comfortable and substantial house, and with this we have generally been content. But ingenuity has long fretted impatiently under this sense of hopelessness, and it is at least possible that in the course of time it may find a remedy.

From the first, the desire to supersede, in London, the meanness of the brick wall took the direction of the imitation of stone. But it was no more than a superficial imitation that was aimed at. Rough-cast of lime mortar need not be alluded to, except to indicate the primitive form of effort, and to remark that the poverty of all expedients of that class led directly to the search for some more substantial plaster, and hence the introduction of the various so called cements. I am not able to say, with regard to Roman cement, that it was not more for its constructive value than its decorative that it was actually first brought into the market; but, with regard to perhaps most of the other cements, it is certain that inventors looked chiefly, if not entirely, to the superficial imitation of stone. The extent to which cement was used in this way, in the earlier part of the present century, is well known to all; and two questions arise in reflecting upon this,—namely, first, the constitution of the several cements as artificial stone, and, secondly, the æsthetic point of the legitimacy, or not, of the employment of such superficial imitations. A third question,—namely, the constructive value of the cements used as mortar,—we of course pass by.

The question of taste is to be decided, at least to my satisfaction, in this way. That a builder may do well as matter of taste to cover a rude surface of wall with a plain facing of plaster, no one would dispute; and that an architect may do this for the purpose of dealing *decoratively* with such plaster, it would be equally idle to deny. The essence of the proposition, however, turns upon the idea that in dealing *decoratively* with the plaster surface the architect shall do so *artistically*. Whether this involves or not the idea of dealing *truthfully* is then the sole point of dispute. If he imitates stone, it may be said, he deals untruthfully. But there are two ideas in this imitation of stone. If the semblance be one of material only, this is one thing; if of structure, it is another. The imitation of material, if done upon material of the same class,—graining upon wood, marbling upon plaster, bronzing upon iron, compo upon brick,—I hold to be no offence, but a charming form of legitimate art, *in its place.* But the imitation, by means of plaster, of stone *construction*, is a more serious question as regards the truthfulness of art; and a cement front, ashlared, rusticated, with arches and lintels jointed, tooling imitated, and so on, I should not like to defend. There are many forms of moulding and ornament, however, to which plaster is applicable, and not a few of those which we may at first sight deem to be essentially stone forms; so that, although I am not indisposed to echo the common denunciations of compo architecture, I must reserve a good deal in doing so.

I have thus indicated pretty clearly how far I ask you to sympathise artistically with the use of cement imitations of stone, and we may therefore now look at a few of the chief materials of the kind as they were introduced early in the present century.

Roman cement, as the first, may be said to have come into existence with the century, having been patented by Parker in 1796. The name was given to it at a time when anything professing to be of ancient Roman origin was deemed to be supernaturally excellent; and it was to be understood that the patentee had discovered the means of making cement after the ancient Roman manner. What connection may have been at the time set up between the volcanic puzzolana of Italy and the septaria at the mouth of the Thames, is, however, of no moment in our present discussion. There was a peculiar argillaceous limestone found in small lumps in the London clay at certain points on the east and south coasts of England, containing carbonate of lime 50 to 60, clay 34 to 47, and oxide of iron for the remainder—3 to 7 per cent. It was subjected to a moderate heat, but not calcined; then ground to a fine powder; and so used instead of lime; one or two of its own bulk of sand being added for the external plastering with which we are now dealing. I need not remark that it is still widely used, setting quickly and hard; but that its dark colour is unfavourable. Atkinson's cement, next brought out, was a variety of Roman of lighter colour, made from the septarious stone found in Yorkshire, which contains more than the Medway proportion of carbonate of lime. The experiment was at least once made of using this cement in blocks as ashlar stone, namely in the case of a house still standing in Mount Street near Hyde Park. The building seems to be about forty years old, or a little more, and the artificial stone thus tried is still substantial; although, if I remember rightly, it does not wear its natural face, but a coat or two of colouring. One circumstance worth remarking is, that this specimen exhibits very strikingly a certain defect, which will probably be found to attach to all artificial stone ashlar, namely a sort of unnatural texture or obtrusively artificial surface, produced by the necessary regularity of the imitation tooling.

Austin's artificial stone was introduced some fifty years ago in the manufacture of statuary, garden ornaments, chimney shafts, and the like. It is generally considered to be little else than ordinary cement; but it is plain there is much more ingenuity in the matter than this. At all events, so far as we are concerned, it is evidently a concrete of sand and so on, cemented by lime of some sort; and it is used as artificial stone, properly so called.

Mastic or oil cement is of the same period as the others just mentioned, and was the staple material used by Nash. It was made of pounded limestone and sand, concreted by means of linseed oil and litharge. It was employed as plaster only, and has now long gone out of use.

Portland cement, the latest and best of all, is so far akin to Roman that it is made from the same components, limestone and clay, but by quite a different process. The present mode of manufacture is, I believe, this: The mud of the Medway, corresponding to the argillo-calcareous stone of the Roman cement, is mixed with chalk and ashes from former makings, and calcined at a heat amounting almost to that of vitrification. It is said that a chemical combination is thus effected between the lime and clay similar to that which exists in the natural septaria of the Roman cement; but of superior value, as we all know, as regards the hardness of setting and the colour; being, in fact, the most beautiful substitute of its kind which has ever yet been brought into comparison with stone. I am not aware that it has ever been used for building in blocks; but it is quite common cast in ornaments. It is also to be noted that it is mixed with a larger proportion of sand than Roman cement.

Confining our view of such cements to those thus set forth, it will be seen that Roman cement, if used with sand, is an argillo-calcareous sandstone, the proportion of sand, however, being but small if compared with natural stone; that Portland, if used with sand, is the same, with a larger proportion of sand; and that Austin's artificial stone is still the same, with the sand &c. in apparently still larger quantity. The oil mastic we need not take into account. The blue lias cements more recently introduced, and metallic cement, (the latter made, I believe, of blue lias lime, sand, and smithy ashes,) are also plainly of the same argillo-calcareous character as those described. In short, we perceive that all these imitations of stone thus far are calcareous sandstones of the same type. With regard, however, to Roman cement or Portland if used without sand, we should call the product of course argillaceous limestone: but this is scarcely practical ground, as there could be no possible benefit in view in attempting to dispense with the sand, but rather the contrary.

The material lately brought out in France, called Coignet's Bêtons Agglomérés, is of still the same essential character, a calcareous sandstone. The process of beating, I believe, is an important feature in its manufacture, not as any novelty, of course, but as a means of thorough consolidation by the expulsion of the air, which no amount of dead pressure, for example, serves so well to accomplish. But there is another point of interest. In an English patent, 1859, No. 2757, the same inventor argues that the tenacity of mortar is not produced, as hitherto supposed, by the formation of silicate of lime and alumina, but by the crystallization of lime. He therefore advocates, in the act of mixing, not only the pressure, "by repeated blows and shocks," already spoken of, but the use of the least possible quantity of water, so that the desired crystallization may not be interfered with by moisture. This is, at least, shrewd practical logic. I am inclined to think Austin's stone owes a good deal to such a way of thinking.

We come now to the remarkably ingenious and scientific proceedings of the last few years.

Ransome's Siliceous stone comes first in point of date; and, although we call it a thing of yesterday, so rapid is the passage of time that it is nearly twenty years old. (The patent dates 1844, No. 10,360.) The inventor of this material seems to have been led to consider the question of artificial stone by the suggestion arising in his mind that for a certain kind of mill stones the usual natural material might be improved upon. He thought it might answer to mix sand and pulverized glass under pressure, and subject the mass to such a heat as to fuse the glass, and thus concrete the whole. As an improvement upon this, it next occurred to him that the vitreous cement might be supplied in some liquid form; and that this might be silicate of soda, a substance associated with the name of Dr. Fuchs, of Munich, since 1825, under the name of water-glass. With this he considered he might moisten the mass of sand, and vitrify, as before, with less heat. Accordingly this became the process of manufacture. He took calcined flints ground to a fine powder, mixed therewith common soda (sub-carbonate of soda) rendered caustic, and water, boiled the mixture under pressure of steam, and thus obtained the silicate of soda in a liquid form. To 1 of this water-glass he added 10 of sand, a little pounded flint, and a little clay; mixed the whole to a putty; made castings of the desired form under compression; dried these; burnt them in a kiln to a bright red heat; and so made them blocks of stone. The chemical question was this: the alkali of the soluble silicate of soda combined with a portion of the natural silica or sand, and thus formed an insoluble silicate or glass, as a cement, wherewith the remainder of the sand became concreted together. That this was a most ingenious and novel material is plain. A sandstone was produced, and technically one of siliceous type; but its cementing medium was not crystalline as in nature, but, as an equivalent, professedly vitreous. This vitreous element, however, was always seen to be its blemish. This stone was, nevertheless, largely manufactured, and, to some extent, used in building, in the form of cast ornaments.

Meanwhile there was going on in a kindred but dissimilar form a still more anxious enquiry with relation to stone, namely, how to preserve it from decay in the destructive atmosphere of London,—more immediately how to save from daily decomposition the new Palace of Westminster. Various processes were tried and canvassed before the public with no little debate. Amongst the rest there was one to was attached the name of Mr. Ransome. Whatever might be said of this as regarded practical efficiency, no one could deny it the merit of remarkable theoretical ingenuity. It proposed nothing less than to deposit within the pores of the stone solid and insoluble silicate of lime; this silicate of lime, we may remark in passing, being the combination to the formation of which chemists have been chiefly accustomed to refer the gradual hardening of old mortar,—the lime and sand being supposed to act upon each other in this way. To apply to the surface of the stone the soluble silicate, or water-glass of Dr. Fuchs, had been distinctly and publicly suggested in France by Kuhlmann in 1841, and Dalemagne in 1851, if not by others; and, as Dr. Hofmann argued in this room, it was to be expected that, by a very slow process but a certain one, chemical re-action would cause silicic acid to combine with the superficial substance of the stone, thus to form a very hard crust. But it was plain enough, in London at least, that this process could not withstand either the humidity or the uncompromising impurity of the air. Szerelmy's Zopissa, with what may be called an unpopular affectation of secresy, supplied a supplementary measure by coating the silicate-saturated surface of Kuhlmann, with some preparation of a bituminous and albuminous nature; but this was no better than paint. The English inventor offered a supplementary measure of quite another kind. He would apply upon the saturated surface a solution of chloride of calcium: a double decomposition, he declared must, not slowly, but instantly take place, and the silicate of soda and chloride of calcium become silicate of lime and chloride of sodium,—the one an insoluble substance, filling up the pores of the stone, and the other common salt, to be washed out by the weather. Experiments were made to prove the fact; pieces of the putty out of which the siliceous stone of the patent was being daily made,—sand, that is to say, mixed up with silicate of soda,—were dipped in chloride of calcium. The inventor said they ought to come out of the bath changed to hard and solid stone; and so they did. Mr. Ransome will show you presently, by experiment, how simply this was accomplished. The result was, however, two-fold; not only was the formation of the solid silicate indisputably demonstrated, but there was created by the act of demonstration an entirely novel species of artificial stone.

The inventor has to thank this Institute for having been, in a manner, the motive power which set his ingenuity to work towards the production of this remarkable material. The question of the stone preservatives started here in January 1861, by Mr. Tite, and debated most ably during three successive meetings, led to the appointment of a Government commission. Before this commission Mr. Ransome, amongst others, had to maintain the accuracy of his theory against learned contradiction. He was met by the home thrust that such a theory would prove its own value by an attempt being made to consolidate stone dust on the spot. The result was as we have seen. He astonished the doctors, and they accepted defeat. His own astonishment he kept to himself, and took out a patent without delay.

Ransome's Concrete Stone is the name given to this new material (patent of date 1861, No. 877).

The process of manufacture is eminently simple. Omitting some minor details, we may state it thus. Sand, or pounded chalk,—or, in fact, any similar substance,—is mixed to a stiff paste or putty with the liquid silicate of soda, and moulded to the required form in a similar way, so far, as in the former manufacture of the silica stone; but instead of being burnt in a kiln, as before, for vitrification, the block is now merely dipped into, or saturated with, chloride of calcium, and almost instantly the chemical reactions are carried into effect, and there is a piece of perfect stone in the hand,—solid, hard, strong, and durable. The sand, or whatever else, is firmly concreted together by a cement of silicate of lime; if made of natural sand, it is, to all appearance, natural stone; and the only singularity about it may be said to be that its substance is pervaded by about 3 per cent of common salt.

This is obviously, like all former attempts, a sandstone; but now of truly siliceous type, far preferable, in every way, to the vitreous character of the previous invention of the same author. The salt contained in its substance is the defect to which every one will point who appreciates the question of dry walling; as salt, even in much less proportion than 3 per cent., is a notoriously absorbent agent; but I am given to understand that a process of steeping in water is all that is required to remove the obnoxious ingredient. The employment of the stone in building has not, as yet, I believe, gone beyond cast ornaments and moulded work; but the inventor not only contends that it may be used as a cheap and durable ashlar facing, but professes to supply it as material for the chisel of the carver.

The entire range of questions of durability and strength are stated to have been fully answered, so far as experiment can go, in favour of this stone, fairly matched with our ordinary best freestones; but this is mere matter of advertisement, which need not be entered into by me. I would say that the appearance of the samples seem to be sufficient evidence of the proposition, that with good sand there is made thoroughly hard and strong stone; whereas, on the other hand, as regards durability, this is a subject involving so many accidental considerations, that I am afraid no amount of experiment will satisfy those perhaps justly suspicious minds which can recognise no test but time.

I have suggested to Mr. Ransome to prepare for our inspection, if possible, a few samples of what sort of stone he could make, for decorative purposes, of granite dust, marble dust, and other such material, more fanciful than merely substantial; and I believe he has prepared various samples of the kind.

I have also put a somewhat singular question to this ingenious gentleman, and asked him to be prepared to-night with a definite and practical answer. When, a few months ago, speculation was a good deal indulged in how to procure for the proposed national monument to the late Prince Consort a great granite monolith, I remember the point was pretty well set at rest by the argument that nature was simply against the idea,—that the best we could possibly do would go no further than to exhibit our inferiority to the ancients,—in a word, that the British islands could not produce a stone to be at all compared with those dug 3000 years ago from the quarries on the Nile. Now I confess that this argument did not satisfy my mind, and that the question took with me this form. Suppose, instead of inquiring whether we can find in the earth a stone 100 feet long, we should ask each other whether we could contrive to *make* a stone 200 feet long. To build an obelisk of brick is of course sufficiently easy; to face it with coursed stone is easy also; but I have asked Mr. Ransome to consider whether he could face it with artificial polished granite, solid and durable, and without a seam. I can only say for myself that, if I rightly understand his process, I think he ought to be able to answer in the affirmative. Whether so or not, however, I think it is a fair question, and not only for Mr. Ransome, but for any other such competitor with nature.

But my list of recently introduced principles for the imitation of stone is not yet exhausted; there are other scientific discoveries to be set forth, which many will think to be equally refined and interesting with the last.

I happen to have hinted, in passing, that one theory of the chemists, in respect of the remarkable hardness of very old mortar, is that in the course of ages the lime and the sand have slowly entered into a somewhat indistinct combination as silicate of lime. If I remember rightly, Mr. C. H. Smith told me that he had tried an experiment on this point, by placing a portion of lime mortar on a polished surface of flint, (silica of the best for the purpose,) and actually waiting twenty years before he removed it; and that he found the silica untouched by the lime—the polish of the surface unclouded. But be this as it may, another well-known theory is that the more ordinary induration of mortar, in all circumstances, is the result of an absorption from the air of carbonic acid. Quick-lime, of course, is calcined limestone,—carbonate of lime from which the carbonic acid has been completely driven off by heat. When slaked and made up in mortar, it is a hydrate; when set hard, after a short time, it is simply relieved of its water by evaporation, and left to the cohesion which any other paste or putty acquires when dry. Then, says our theory, a slow process is set up, whereby the lime recovers from the air the carbonic acid which was separated from it in the kiln, and the hydrate becomes gradually a carbonate again—actually limestone again—and so grows harder and harder in course of time.

Now, if a piece of limestone taken from an old wall be carefully examined at the joints, it is found that the mortar adheres in such a way as to form, in immediate contact with the stone surface, a sort of crust which is harder than the rest. Mr. Westmacott, who is present with us this evening to lend his aid to our inquiry, has cleverly laid hold of this fact in the following way. This special induration of the mortar, he argues, is manifestly owing to the absorption by the lime of carbonic acid *from the stone.* And if this be so, says he further, take common lime and sand, like mortar, and add thereto to a certain proportion of the uncalcined carbonate, for the mere supply of the carbonic acid, and we have a perfect imitation of natural stone—a calcareous sandstone; and further, if, instead of siliceous sand, we adopt calcareous, the stone is equivalent to a natural limestone. Specimens of the material thus produced are before us; and it certainly appears that, in the course of a few weeks, any block made in this way, with common lime concrete and a prepared carbonate, turns out to be apparently a very hard, strong, and durable stone. As this invention is only in its infancy, it will be sufficient to speak of it in general terms. Mr. Westmacott has patented the invention in its application to mortar, plaster, and some other subjects, but not, I believe, as referring to stone. The application of Coignet's rule, by-the-bye—little water and much beating—would probably be very serviceable in any stone thus made.

There is a patent, however, (Bousfield's, dated 1856, No. 2282,) which proceeds a little way upon the same principle, as applied directly to the manufacture of stone. By this plan, 80 or 85 parts of ordinary chalk, and 15 or 20 of slaked lime, are mixed together, moulded under presssure, and dried in the open air; when the blocks, says the patentee, "will be found to possess a degree of compactness and firmness resembling stone, which increases indefinitely with age, and, if the ingredients are pure, will rival marble in whiteness and beauty."

Another patent, (Ellis's, dated 1857, No. 1389,) by a Canadian engineer, is worth noting. The patentee professes a good deal that may interest us. First, he takes liquid silicate of soda, (the water-glass of former mention, and the material of both Ransome's processes,) and mixes with it a strong cream of lime and water. This, he says, makes a firm and insoluble silicate of lime, and with it, as a cementing medium, he professes to concrete together what he calls "a great variety of materials." For imitations of natural stone, he employs the same stone reduced to powder. This, of course, may look, at first sight, like pulling nature to pieces for the satisfaction of reconstruction; but this criticism would not be just, for no doubt there are many species of stone of such feeble cohesion as to be worthless which might very economically be crushed to sand and made up again with the silicate of lime. For imitations of marble, he takes shells and marble ground to powder, and mixes with the silicate of lime as before. With granite he takes a similar course; and he mentions "freestone, slate, porphyry, malachite, and other stones," as within the reach of ingenious manufacture by his process. He takes, also, such a thing as pounded brick ballast, or slag, adds ground limestone, and makes up, as before, with his silicate of lime; and so on. But this is not all. He is the forerunner, not only of Mr. Ransome, but of Mr. Westmacott also. He takes carbonate of lime, ground to a fine powder, mixes therewith a proportion of ordinary ground slaked lime (the hydrate), damps the mixture with very little water, moulds it, under pressure, in polished metal moulds, and turns it out polished stone. As to the precise form of his invention, he says—"I do not claim generally the use of alkaline silicates in the manufacture of artificial stone;—I do not claim the (second) manufacture of artificial stone, when the carbonate of lime is merely coarsely powdered or granulated, as I have found it necessary that it should be reduced to a fine powder or flour." It thus appears how closely he approached empirically the delicate scientific principle of Mr. Ransome, and the equally refined perception of Mr. Westmacott; especially the latter; but how effectually he missed both, leaving it to Ransome to suggest the use of chloride of calcium, and to Westmacott to point attention to the fact that the best use of the ground carbonate was not to make an impalpable paste and a polished surface, but to supply rapidly, whether fine or coarse, that carbonic acid which the lime must otherwise draw slowly from the air.

The only other invention I have to describe is Barff's patent; 1861; No. 1738. Ransome deals with the cementing strength of silicate of lime; Westmacott directs us to carbonate of lime; Barff turns to quite another quarter, and introduces silicate of alumina. But he does not merely revert to the notion of the hydraulic cements, which may be said to rely as much upon the alumina of their composition as the lime; (hence the supposed silicates of lime and alumina rejected by Coignet;) but he dispenses with the lime altogether, and depends upon the alumina alone. It may also be noted, in favour of this idea, that in Ransome's principle Barff's is distinctly recognised, inasmuch as the washing or dipping solution described in Ransome's patent of 1861 is not alone chloride of calcium, but, as an alternative, chloride of aluminum;—that is to say, the ultimate cement to be produced might be either silicate of lime or silicate of alumina, according to the choice of the operator. But whether Mr. Ransome has ever operated with silicate of alumina in this way I do not know; even if he has, however, the mode of Barff is quite different.

The process which Barff follows is as simple as any. Preliminarily, if we take one part of an aqueous aluminate of potash, he says, with three parts of the alkaline silicate, or water-glass, so often mentioned, (silicate of potash, however, not of soda,) the mixture will, in a few hours, set into a sort of dull glass—in fact, an artificial felspar, perfectly brittle and of no very great tenacity, but altogether insoluble in water. This, then (of which samples are produced) is silicate of alumina; and with it, while liquid, the inventor makes up sand, or any other such dust, into a paste, moulding this into blocks, as in any other case, and then placing the blocks to dry in the open air, until the cement has set hard. The sample before you is formed of Bath-stone dust; I have attached it to a piece of Bath stone on one side, and a piece of Terra Cotta on the other; the points of singular resemblance and slight contrast will be easily perceived. I have also invited a representative of the patentee to attend, and afford further explanations.

This closes the list of the chief substances produced as artificial stone, and I have only now to leave their criticism in your hands. There are many questions which I might wish to raise, such as the cost of production, the resistance to London's soot, the means of cleaning off that soot, the possibility of carving when desirable, the absorption of moisture, and consequent risk of damage by frost and heat, the absorption also of atmospheric gases, and consequent risk of damage by direct decomposition. But these I should have to argue at considerable length if I entered upon them at all; so they must be passed over with suggestion only.

The artistic question of the use of such materials I must also not attempt to deal with, further than to say that I for one should be very lenient in my criticism of any really successful attempt to cover the nakedness of London brick; and provided the more needless and ignorant forms of sham were avoided, I should not expect too much originality at first.

With this I beg leave to bring to a close my introduction of what I consider to be a subject well worthy of your detailed discussion, thanking various friends present for aid already given, and requesting them and others to aid still further by placing before the meeting many facts and arguments which I may have overlooked.

(Samples of natural and artificial stone, &c., were before the meeting, provided by the Lecturer and the various manufacturers interested.)

The Chairman said, before we enter upon the discussion of this most interesting subject, I am sure you will all be anxious to return thanks to our friend Mr. Kerr, for his very able and lucid paper. [A vote of thanks was passed by acclamation]. I think, then, the more convenient mode of proceeding will be, that the gentlemen who have attended this evening to give us explanations and illustrations of their processes of manufacture of artificial stone should do so at once, as shortly and as clearly as they can. I will, therefore, call severally on Mr. Ransome, Mr. Westmacott, and Mr. Barff to address the meeting.

Mr. Ransome, Visitor.—The materials employed in the process Mr. Kerr has described as being patented by myself, are composed principally of sand and clay, although other materials may be used if it is more convenient to adopt them. This substance, which I have here (produced from a small metal box), is simply common sand, with from 5 to 10 per cent. of clay, combined with a certain proportion of silicate of soda. The sand and clay being properly mixed with the silicates in the proportion of about one gallon of silicate to one bushel of material; it is then pressed into moulds, which may be made of iron or wood, or even of plaster of Paris, (according to the purposes for which the article is required), and afterwards saturated with a solution of chloride of calcium. The specimens before you are principally prepared from plaster of Paris moulds. Here (referring to a specimen) is a thin slab of stone which has been produced merely by passing the sand and silicate between a roller and an iron plate, and afterwards treating with a solution of chloride of calcium. This (pointing to another specimen) which I have here, is simply a mixture of sand and clay, with the proportion of soluble silicate, and which, as you will see, is now in a soft pulpy state; but which, upon being immersed in a solution of chloride of calcium, is almost instantaneously converted into a hard compact stone. By this last operation the silicate of soda is decomposed; the *silica* combines with the lime, forming silicate of lime, and the chloride combines with the soda, forming chloride of sodium, or common salt. If I immerse a piece of this material, which is merely a mixture of sand, clay, and soluble silicate, [illustrating] in a tumbler of water, you will see it not only does not harden, but falls to pieces, showing that the soluble silicate of soda cannot resist the ordinary humidity of our climate. But now I will call your attention to this piece of the same material which has subsequently been immersed only for a few seconds in a bath of calcium. [The specimen now exhibited showed a considerable amount of induration]. The combination, as you now see, is very rapid, but it must be understood that in the few minutes, during which I have described the process, it is not to be expected that the silicate of lime has attained its maximum hardness: on the contrary, it is now in what we may term a gelatinous state: it will gradually pass from that into the crystalline, and in that transition materially increases in hardness and intensity. You will see it more clearly illustrated if we put the two separate solutions—viz., the silicate of soda and the chloride of calcium into a glass without mixing any extraneous matter, double decomposition immediately takes place, and a gelatinous silicate of lime is instantly formed; but it remains, as you will observe at present, in a gelatinous form; by degrees this passes from the gelatinous into the crystalline state, and as it passes into that state it hardens. The only amount of cohesion, or the only bond of union this piece of stone possesses, at the present moment, is simply that which is derived from the production of a substance similar to that you observe in this glass, produced in a few seconds; and, therefore, although in these few minutes it has attained such an amount of hardness as makes it difficult to break, yet in the course of a few days the comparison between the strength of the one and the other will be much more obvious. [Mr. Ransome pointed out specimens which had been prepared in the way he had described in various kinds of moulds]. He proceeded.—The question of strength has been alluded to by Mr. Kerr, and these [pointing] are some pieces of stone which have been prepared expressly for the purpose of testing their power of cohesion. This block [pointing to a specimen] of natural stone from the celebrated Park Spring Quarry, has been tested and broke with a weight of 10½ cwt. These [pointing to other specimens] are two blocks of the Patent Concrete Stone, made of exactly the same dimensions and tested in the same way, and they broke with a tensile strain of 17½ cwt.; and here is another similar block of the concrete stone, which has remained uninjured with the same amount of strain upon it. The sectional area is the same in each case, and the reason I apprehend why this latter specimen has sustained the great pressure and remained intact is principally in the fact that it has been made a little longer time than the other specimens which broke. We have experimented very largely upon this material, and in the paper I have handed to the secretaries there are details of experiments carried out by Mr. Burnell, showing the extraordinary capabilities of the Patent Concrete Stone to sustain a great amount of transverse and tensile strain, as well as to resist a heavy crushing weight. A 4 inch square block of the material, of which this is a portion, taken from the same block, sustained a pressure of upwards of 30 tons! [The Chairman.—Have you any specimens which show how deep the process penetrates into the stone.] Mr. Ransome.—I have nothing here larger than the specimens on the table, but I may state that some of these fragments are taken from the centre of a stone two feet thick; and it was upon a fragment cut out from one of those large blocks of stone that the experiment I have alluded to was made. The pieces were taken from large blocks weighing from 3 to 5 tons each. A block was opened, and from the centre we cut out a cube of 4 inches; that was submitted to pressure, and was found to stand a crushing weight of 30 tons. These are fragments I believe from the same block.

The Chairman.—This is the most interesting point of the whole discussion, because in former experiments in most instances it has appeared that the material applied has not penetrated deeper than a quarter of an inch below the surface; if, therefore, this specimen has been taken out of the centre of a two feet cube it is very remarkable indeed.

Mr. Ransome.—That is one of the objections to my process that I was met with from the commencement—viz., the fear expressed by practical men as to the possibility of penetrating a mass of a given thickness; and it was mainly with the view to ascertain the effect produced in the heart of these stones that the block to which I have alluded was purposely cut in halves. But before that was tried I had satisfied myself that our experiments need not be limited to the construction of blocks of 2, 3, 4, or even 6 feet in thickness; from watching carefully the effect produced upon some large blocks in process of manufacture. In order to test the penetration of the chloride of calcium a temporary edge was left on the upper surface of the blocks of concrete stone, in order that the whole of the solution of chloride of calcium might be applied from the upper surface. These stones were not immersed in the solution—as you might be led to suppose from the statement of Mr. Kerr—but every drop of the chloride of calcium was poured upon the upper surface, and we could detect from watching, inch by inch, with the greatest nicety, the depth to which this chloride of calcium was penetrating this mass of stone, and in a block of 2 feet in thickness, the whole mass was perfectly saturated, and the solution of chloride of calcium oozed through the pores of the stone like perspiration from the skin of the body; therefore, I was not so much surprised at the result when the stone was cut open.

Mr. KERR.—Do you apply the solution externally to indurate the surface.

Mr. RANSOME.—Instead of its being what might be imagined, a porous and fragile mass, such is not the case, but, on the contrary, it is a hard and compact stone; and I may illustrate that by stating, that when I commenced working out the details of this process, my own impression was, that to effect a successful result, it would be necessary, after having mixed the sand with the first solution of silicate of soda, and formed it into a block, it would be desirable to dry it, so as to expel as much of the moisture as possible, and to make way for the ingress and egress of the chloride of calcium. In carrying out those experiments, we did, at first, find some difficulty in getting the solution of chloride of calcium to penetrate beyond four or six inches; and it was next door to an accidental circumstance by which, instead of submitting these blocks to a certain heat to dry them, we found, by applying the chloride of calcium immediately, while the silicate of soda was in its moistest form, and when the stone was no more nor less than a pulp, that the water was the best vehicle to assist the permeation, and thus produce the double decomposition. The chloride of calcium so applied rapidly permeated the whole mass; and if the chloride of calcium is applied in succession, from the time the block is first made, I believe there would be no difficulty in making a stone of eight or ten feet square. The materials will be found to be so reasonable in cost, that we anticipate—and, I may say, we are prepared to supply—blocks of stone at quite as low prices as natural stone in the City of London. But when you take into account the cost of carriage, and the workmanship required on the stone, we shall be prepared to show that the whole of that outlay ought to be profit upon the manufacture of this material. As I have already stated, one gallon of each solution is sufficient to produce a cubic foot of stone. In making that calculation, I allude to the finer descriptions of material. The proportion of silicate and chloride of calcium, which are the only two ingredients with reference to which there is expense; the quantity required will depend upon the size of the grains of the sand, the concrete of which it is composed. The finer the quality of the sand, the larger is the quantity of solution required; but if, in the place of fine sand, we substitute shingle and stones, the cost of a block of that description would be less than half what the other would be. Mr. Kerr has alluded to the origin of this invention, which took its rise from the remarks which were passed before the Committee appointed to investigate the causes of decay of the stone of the new Houses of Parliament; and the specimen I now hold in my hand is composed of the powder produced from crushing the Bolsover Moor stone, combined by the same process. With respect to indurating the surface of the stone, and in order to render it perfectly non-absorbent, the stone, after it is formed into blocks, is treated a second time with silicate of soda, and a second application of the solution of chloride of calcium.

The CHAIRMAN.—I am sure we owe our sincere thanks to Mr. Ransome for the very clear and unpretending way in which he has brought his process before us, and perhaps Mr. Westmacott will allow me to call upon him to say a few words upon his plans, if he is prepared to do so.

Mr. WESTMACOTT, Visitor.—As my patent is yet in its infancy, I have but a few specimens with me to-night, but sufficient, I think, to show the various ways in which my cement can be used. Before I explain these, I will make a few remarks, showing how I was led to the application of my principle. In the course of my experiments I found that upon testing a calcareous stone, burning a portion of it, and bringing it back as an hydrate of lime, that placing it upon the unburnt part, it was much superior at the points of contact than when placed upon brick or any silicious stone; in fact, I could scarcely distinguish where the lime ceased, or the stone began; the thought occurred to me that by pulverizing the unburnt and multiplying the points of contact, a similar result might be produced throughout the mass, my only fear being that I should, by so doing, lose cohesive power, but to my surprise I found that within certain proportions, instead of doing so, I gained; for that one part of lime and two parts of chalk produced a cement much harder and capable of cementing a larger portion of sand than if the three parts were pure lime. I have here a specimen moulded from a stiff paste which consists of one part grey lime, two parts chalk, and twelve parts of river sand—that is, having fourteen parts of insoluble matter to one of soluble: this specimen has, I believe, indurated throughout, and will bear a pressure greater than Portland stone. I will now describe the two forms in which I prepare it: if wanted for common mortar, I slack the lime and mix the ground chalk with it, to form a cream, then add sand with it in the usual manner; this I use at once, but it will improve by age if kept damp: in this form it indurates gradually, varying according to the weather and amount of sand it contains from the sixteenth to one-eighth of an inch per week; but, for some purposes, as an instance, rendering plaster, I mix the sand with the lime and chalk in a pure state before adding water, the difference being that whereas in the first form the mortar gradually indurates, in this, I can place it upon the laths before the lime slacks, which generally takes place in about an hour, and it sufficiently hardens to allow of the second coat to be followed much quicker than usual, often the same day; and though it does not eventually indurate to an equal strength to the first method, yet, in the opinion of practical persons, it forms a plaster harder and stronger without hair than they have hitherto seen with that material combined. Another quality it possesses—viz., it is not liable to crack. [Mr. Westmacott introduced specimens made at different dates]. He continued—I have also specimens of an external stucco, in which a highly hydraulic lime is used [he exhibited specimens of these] in which there is one part lime, two of chalk, and two of sand—this stucco indurates quickly through the mass. Mr. Westmacott next pointed to a specimen of cement made in August last, consisting of one part grey lime and two of chalk, as one of his oldest specimens, and which had been in his garden since that period, showing the extent of hardness it is capable of attaining by age and subject to atmospheric influences.

The Chairman.—Do I understand you to say you use nothing but natural materials, and no chemicals?

Mr. Westmacott.—Nothing whatever—the only chemical effect, so far as I can at present perceive, is produced by my supplying at once a large proportion of carbonic acid in the carbonate of lime, which in the present mortar has to be supplied in the course of centuries by the atmosphere—indeed, one cause of my entering into a series of experiments during leisure hours was, from reading in a paper that in a wall twelve feet thick and several centuries old, the mortar in the centre was found not indurated, and analysis proved that, in proportion as it was so, a larger absorption of carbonic acid had taken place. I now invite your inspection of two pieces of natural stone, the interstices on one side of each I have filled up with the cement: this I effected by a trowel, and in about three minutes the polish you see was produced. I find, also, that by the addition of a little plaster of Paris, a good internal cement is produced (showing a specimen) which dries quickly, and is much harder than plaster of Paris. The only point I have now to notice is a most important one—viz., its cost, which will be less than common mortar.

The Chairman.—Because it will take more sand.

Mr. Westmacott.—Yes; and because two-thirds of the cementitious material used is less than half the cost of lime. I shall be pleased to find Mr. Ransome supplying his stone for many buildings, and can only add that I shall be happy to cement them together with a tenacious and durable stone mortar. I have now, Sir, to express my thanks for the privilege of making this statement, and for your kind attention.

The Chairman.—To follow out the plan I have prescribed, I will now call upon any gentleman respecting Mr. Barff's process to address this meeting.

Mr. Trotman, Visitor, then came forward and said,—I should explain that I am the representative of the firm of Bartlett, Brothers, & Co., who work the patents of which Mr. Barff is the patentee. Mr. Kerr, who has read the Paper this evening, has touched upon a process in which the firm with whom I am connected are interested, namely, the manufacture of artificial stone with silicate of alumina. I should tell you, in the first place, that we were brought to the discovery of this material for artificial stone by using it for the purposes of induration. The silicates of soda and potash have been known for years, but they have not borne out the expectations of those most deeply interested in them, and a great many difficulties yet remain to be overcome. We lay claim to having overcome *one* great difficulty, that is, in their decomposition. The ordinary method of decomposing the silicates has been through the use of acid re-agents. So instantaneous is the effect of these re-agents that, in the process of decomposition, a tearing up as it were takes place, and there is not that crystalline, or regular production, one would look for. In our own case we overcome that objection by taking a re-agent in the same kind of menstruum as the silicate—that is to say, an alkaline solution of the re-agent, instead of an acid solution of the same. Thus, we take a silicate of potash and an aluminate of potash; these, mixed together in their proper proportion, will remain liquid for any period of time within reason; therefore, instead of the instantaneous decomposition which takes place in ordinary re-agents, they remain liquid, and you may mix them up with any materials you choose, or pay them over a surface, or do what you will with them. All who are acquainted with the silicate of soda and potash, are aware of their extreme viscidity, and anything mixed up or coated by them is rendered thereby impermeable, and therefore, to get another solution into such silicates, much less behind it, for their decomposition, was impossible; the only alternative was, therefore, to put on the two solutions as one, and let them go in as one; decomposition then setting in, mere dryness is all then necessary to produce this material—[Hands to the Chairman pieces of glassy substance, silicate of alumina.] This material is nothing more than silicate of potash and alumina allowed to dry. We argued, that if this material, in a liquid state, is put into stone, and receives this form and condition by the mere process of drying, the object of induration is achieved; and, reasoning from analogy, we supposed the mixing of pounded materials with the solution before referred to, would bring about a substitute for natural stone. This [alluding to a specimen on the table] is not prepared for the occasion, but taken from similar ones in our laboratory, and is the silicate of alumina mixed up with pounded Bath stone, which produces, when dried without heat, the artificial stone before you. I would also make a few remarks upon a patent of ours preceding that patent. The one of which I now speak was taken out antecedent to those interesting meetings held by this Institute in January, 1861, because we date as far back as October, 1860. I will read a few lines from the Specification: "To obtain artificial stone by my improved process, I employ powdered pumice-stone in combination with soluble silicates, such as silicate of soda or silicate of potash." I should premise this by saying, that in looking for materials to combine, such for instance as sand, chalk, clay, &c., one naturally looks for the best material to combine with the agents you are going to employ, for their coherence. It was long thought that pumice-stone might be used very advantageously for building purposes; and, in our patent, we lay particular stress upon this pumice-stone, or volcanic lava, because we found it did produce good results: nevertheless, we did not confine ourselves to pumice-stone, but included the combination of other materials that suited the purpose, of a cheaper kind, but giving the preference to the pumice-stone [continues reading of Specification]—"The said silicates being combined with or decomposed by carbonate of lead, carbonate of zinc, or other suitable material insoluble in water, which will decompose or chemically unite with the said silicates, proportionate quantities of chalk, sand, or other similar or suitable substance may be also incorporated with the compound, and thus enable it to be obtained at less cost, in accordance with the nature or description of the work to which it was intended to be applied. Now, here [pointing to a specimen] is a piece of stone manufactured just in that way, viz., with carbonate of lead, pumice-stone, and silicate of soda; it is perfectly insoluble, you may boil it as long as you please, and no effect will be produced upon it. Our Specification states the proportion of carbonate of lead, powdered pumice-stone, and silicate of soda; you may mix these upon a palette in such proportions, and will have there the veritable stone which I now lay before you, without the application of any heat whatever. I have mentioned this fact, because it is an experiment so simply tried, that any gentleman can make with a palette and knife, and by that means see how far my statement is borne out by the result. It may not be *de trop* to say that the silicate of soda and potash, have for many years been taken to be identical, but they are not so. There must be in these liquid silicates a certain amount of free alkali to retain them in solution, if not, they precipitate out of themselves hydrate of silica. If, however, you have too much alkali, you have too caustic a product, and an inferior silicate. For years persons have been trying to produce silicate with as little alkalinity as possible, still retaining a perfect solution of silica. This has been done successfully. We have now a silicate which is very slightly alkaline, yet this amount of free alkali, if it comes into contact with sulphuric acid in the atmosphere, or from materials from which it may be combined, wherever it obtains it (and it is almost sure to obtain it), sulphate of soda is formed. This sulphate, well known as Glauber's Salts, is very soluble, and highly efflorescent: when the weather is wet it retires into, and when the weather is dry it crystallizes out of the stone or substance with which it may be incorporated, and has the effect of tearing to pieces or destroying the surface of the material. Now, as to the potash, the same thing occurs, so far as that the sulphuric acid will get hold of the alkali, and form a sulphate of potash; but this sulphate is perfectly insoluble in cold water, therefore you have no efflorescence from the potash. If you do not get the sulphuric acid, it will deliquesce; but in the majority of cases, this acid is abundantly present in the atmosphere, and you get sulphate of potash, which is insoluble. I might refer you to some of the compounds formed by these silicates. If you take carbonate of lead, and mix with silicate, you make a very hard compound indeed; but a still harder one if ground pumice be also mixed with it. Carbonate of lead and carbonate of magnesia, with ground pumice mixed up with silicate of heavy gravity, makes a most remarkably hard compost; but expense stops us here, so far as its application to the purposes of an artificial stone is concerned. Carbonate of caryta and lime may be combined by the use of the silicates, but they make but a poor compound; compared with the former, they are vastly inferior. It is interesting to go thus from one decomposing re-agent to another, noticing the various degrees of hardness and value, till we come to the minimum, which is chalk. If you take a piece of chalk, and saturate it with silicate of soda or potash, you will find some parts exceedingly hard, while some parts remain very soft: as a rule, however, the whole of the outside is so far hardened, that you are led to suppose the mass is thus indurated throughout; but break it, and the inside is in its normal condition. Many attempts have been made to utilize chalk through the agency of the silicates. If you take, for instance, some pounded chalk, and mix it into a lump or mass with silicate, you find it present externally a hard and most promising appearance; but your bird-of-promise has flown so soon as you cut it through, as you find, perhaps, not more than one-eighth of an inch of the hardened coating which forms the exterior. Why, I cannot perhaps correctly tell, but certainly the peculiarity of the silicate is to come to the outside. I have spoken of the great viscidity of the silicates, and I have already said that any material mixed up therewith is supposed to be impenetrable. I cannot understand, then, how a block of stone, of any size, mixed up with this material, can take into its substance the chloride of calcium, of which my predecessor has spoken to-night. With this single remark, I will let that question rest for the present; but I would say that, with regard to the inside of Mr. Ransome's stone—for there is an inside and outside to this question—I think you will find he says [Quoting from Mr. F. Ransome's Specification of Patent, April 9th, 1861]: "Besides which, it is believed, that it is not only the soluble silicate at or near the surface of the article which, by the application of the chloride of calcium, or other salt, is converted into silicate of lime, or insoluble silicate, but that, throughout the whole mass the soluble silicate becomes slowly converted into insoluble silicate of lime, a portion of the chalk being decomposed to supply the lime to the silica. Thus, it is supposed that the chalk, as the re-agent of the silicate, forms a concrete, after a time, with the sand, which shall be sufficiently hard to carry out the views of the manufacturer." Now, so far as the chloride of calcium is concerned, that is Mr. Ransome's own; but, as far as the interior is concerned, he can hardly lay claim to that, inasmuch as October, 1860, is before April, 1861. With this short statement of our process, and of my views of the other processes before you this evening, I beg to thank you for the kind attention you have paid to me.

The CHAIRMAN.—I am quite satisfied you will agree with me, that we have heard some extremely new, interesting and, in some degree, startling facts, to-night; and I congratulate the gentlemen who have had the kindness to come here for the purpose of communicating this information, upon the temperate way in which their views have been laid before us, without any pretensions to the almost juggling tricks that are sometimes introduced; and we may truly say there is no disguise, either in what they have shown us, or in what they have stated. It is impossible to take the discussion on this subject to-night. You have heard three processes described in a very clear and lucid way, and I think it is desirable now to adjourn the question, that Members may have time to think over it quietly; for, to attempt to begin the discussion now, would, I think, spoil our appetite for another time.

The discussion upon the question was then adjourned until the 27th April, when it was understood that Mr. Burnell would explain the process of Coignet, and, in the mean time, the specimens of those processes that had already been explained should remain in the rooms of the Institute for Members to examine, and that a Committee would be formed for the purpose of witnessing, and reporting upon the operations of their manufacture.

MR. RANSOME'S EXPLANATION OF HIS INVENTION.

It was in prosecuting his experiments connected with a patent for "improvements in preserving stone and other substances, obtained in the year 1856," in which he claims as his invention "the application first, of a soluble silicate of soda, or other alkali, and afterwards of a solution of chloride of calcium, "or other soluble salt, of an alkaline earth, which solutions, upon coming in contact, mutually decompose "each other, produce an insoluble silicate of lime within the structure of the stone—firmly attaching "itself to, and enveloping the particles of which the stone is composed," that Mr. Ransome was struck with the facility and rapidity with which *silicate of lime* was thus obtained, as also with the extraordinary cementitious power which it at once possessed. Observing the remarkable effect that was instantaneously produced upon soft and friable stones, he immediately turned his attention to ascertain how far the same principle was applicable to the *manufacture of stone.*

A comparatively few experiments were now sufficient to satisfy Mr. Ransome that by means of the two solutions—viz., silicate of soda or potash, and chloride of calcium, common sand, chalk, clay, and other almost valueless earthy or mineral matter could readily be converted into a useful and durable material, and accordingly, in the year 1861, Mr. Ransome obtained his patent for the manufacture of stone by such means, which subsequent results have shewn to be suitable, not only for the construction of solid masonry, but also for the manufacture of the most elaborate and delicate architectural embellishments.

The process of manufacture is exceedingly simple. The sand, chalk, or other mineral substance is intimately mixed with its proper proportion of a solution of silicate of soda. This is effected in an ordinary pug-mill, and the mixture, which is thus rendered of a plastic consistence, is either pressed into blocks or moulds, or can be rolled into slabs, or forms as may be desired, and is, afterwards, either saturated with, or immersed, in a solution of chloride of calcium, when a double decomposition of the two solutions employed—(viz., of the silicate of soda, and of the chloride of calcium), immediately takes place. The silica combines with the calcium, and at once forms an insoluble silicate of lime, firmly enveloping and cementing together all the particles of sand, chalk, or other mineral of which the stone is composed, whilst at the same time the chlorine combines with the soda and forms chloride of sodium, or common salt, which is easily removed by subsequent washing.

The cost of production in plain blocks or slabs in most cases is less than that at which natural stone can be obtained, whilst for mouldings, or other ornamental work, the additional labour in working the material is so trifling as scarcely to require notice; the principal item of expense in such work is the preparation of the necessary moulds, but, as these may be made either of wood, or plaster of Paris, they need by no means be costly, and where a repetition of the same article to any considerable extent is required, the proportionate cost of the mould chargeable upon each article would be inappreciable.

The concrete stone has been extensively employed upon the several stations of the Metropolitan Railway, on the London, Chatham, and Dover Railway extensions and elsewhere, and a solid block nearly 8 feet long, and 2 feet thick, was exhibited at the late International Exhibition, for which the prize medal was awarded.

Many large blocks of several tons weight have already been produced, some of which have afterwards been cut open, in order to examine the effect produced throughout the entire mass, when it was found that the portions furthest from the external surfaces were as hard and as completely combined as any other parts of the stone, and further experience has shown that there are no reasonable limits to the dimensions to which blocks of stone can safely be produced by this means.

Amongst the many advantages offered by the process, the following may be especially noticed:

1st. The manufacture is exceedingly simple and inexpensive, requiring no large amount of outlay in the construction of plan, &c.

2nd. The materials employed are for the most part of the commonest productions of nature, and abound in almost every locality.

3rd. The stone can be immediately manufactured upon the spot where it is required to be used, and of the exact form needed.

It is equally applicable for solid constructive masonry, and for the most elegant and elaborate embellishments. In appearance and texture it so closely resembles the best descriptions of our natural stones, that it is next to impossible to distinguish between them, and it can easily be produced of any desired tone of colour.

4th. No waste is incurred in the manufacture, and where desirable, in order to lessen the cost of carriage, the stones can be made hollow as readily as solid.

5th. That whilst most of our natural building stones are rapidly acted upon by acid vapours and the atmosphere, particularly in the manufacturing districts, and in populous towns, to such an extent as produce disfiguration and decay in a comparatively short period, the "Patent Concrete Stone" is not only totally unaffected by such influences, but gradually increases in hardness with the lapse of time; and the opinion expressed by some of our most eminent chemists and geologists is "that Mr. Ransome has invented a material which, with the exception of the primary rocks, is better capable of giving permanency to external architectural decorations than any stone hitherto used."

6th. In point of strength, the "Patent Concrete Stone" has been proved to be superior to Portland stone, or in fact to any of the natural stones with which it has been tested.

The following results were obtained in a series of experiments which were conducted by G. R. Burnell, Esq., F.G.S., and reported upon by Professor Ansted in a paper read by him at the recent meeting of the British Association held at Cambridge.

The transverse strength was tested in the following manner:—

A parallel bar of "Ransome's Concrete Stone," measuring 4 inches by 4 inches, and resting upon iron frames, so as to bear 1 inch on the iron at each end, with 16 inches clear between the supports, sustained a weight suspended from the centre of 2,122 lbs. (or 132 lbs. per inch superficial); whilst a bar of Portland stone, of the same dimensions, and treated similarly, broke with 759½ lbs. (nearly 42 lbs. per inch).

The adhesive power was proved upon pieces of stone notched for the purpose; the sectional area of which, at the weakest part, was 5½ inches.

The specimen of the Patent Concrete Stone sustained . .	1,980 lbs. (or 360 lbs. per inch).
Whilst Portland Stone, of same dimensions, and treated similarly, broke at	1,104 lbs. (or 200 lbs. ,,).
Bath do. do. do. do.	796 lbs. (say 150 lbs. ,,).
Caen do. do. do. do.	768 lbs. (,, 150 lbs. ,,).

A 4-inch cube of the Patent Concrete Stone was found to sustain a weight of 30 tons (nearly 2 tons per inch) before it was crushed.

The Concrete Stone has also been submitted to severe chemical tests by Dr. E. Frankland, F.R.S., &c., &c., Professor of Chemistry at St. Bartholomew's Hospital, who reports as follows:—

"Chemical Theatre, St. Bartholomew's Hospital,
"*December* 21*st*, 1861.

"I have submitted to experimental investigation the samples of stone forwarded to this laboratory, and have now to report as follows :—

"The experiments were made in the following manner. The samples were cut as nearly as possible of the same size and shape, and were well brushed with a hard brush. Each sample was then thoroughly dried at 212 degrees, weighed, partially immersed in water until saturated, and again weighed; the porosity or absorptive power of the stone was thus determined. It was then suspended for 48 hours in a very large volume of each of the following acid solutions, the alteration in weight after each immersion being separately estimated.

"The sample was then boiled with water until all acid was removed, and again weighed. Finally, it was dried at 212 degrees, brushed with a hard brush, and the total degradation or loss since the first brushing was ascertained. The following numbers were obtained :—

Name of Stone.	**Porosity.** Per centage of water absorbed by dry stone.	Per centage alteration in weight by immersion in dilute acid.						Total per centage loss by action of acid and subsequent boiling in water.	Further loss by Brushing.	Total degradation from all causes.
		Of 1 per cent.		Of 2 per cent.		Of 4 per cent.				
		Loss.	Gain.	Loss.	Gain.	Loss.	Gain.			
Bath	11.57	1.28	—	2.82	—	2.05	—	5.91	.26	6.17
Caen	9.86	2.13	—	4.80	—	.67	—	11.73	1.60	13.33
Aubigny	4.15	1.18	—	4.00	—	—	1.04	3.56	.29	3.85
Portland	8.86	1.60	—	1,10	—	1.35	—	3.94	.24	4.18
Anston	6.09	3.52	—	3.39	—	3.11	—	11.11	.27	11.38
Whitby	8.41	1.07	—	—	.53	none	none	1.25	.18	1.43
Hare Hill	4.31	.75	—	—	.60	none	none	.98	.15	1.13
Park Spring	4.15	.71	—	—	.10	.15	—	.81	none	.81
Ransome's Patent	6.53	—	.95	none	none	none	none	.63	.31	.94

"The numbers in the above table speak for themselves, and it is scarcely necessary for me to add, that whilst they point out the Portland, Whitby, Hare Hill, and Park Spring, as the natural stones best adapted to withstand the influences of town atmospheres, they also indicate that Ransome's Patent Concrete will be found equal to the best of these; and if the newness of Ransome's stone (the specimen experimented upon not having been made a fortnight) be taken into consideration, together with the well-known fact that its binding material—silicate of lime—becomes harder and more crystalline by age, I am induced to believe that Mr. Ransome has invented a material which, with the exception of the primary rocks, is better capable of giving permanency to external architectural decorations than any stone hitherto used. I should scarcely have imagined it possible that an artificial material could in so short a time, and without any application of heat, have attained such weather-resisting powers. Its permanency, and the ease with which it can be moulded into any form, must give quite a new impulse to the external decoration of buildings. And in reply to your inquiry, I beg to say that there is nothing in the composition of your Patent Concrete Stone which would lead me to anticipate that it would suffer from exposure to the saline influences of the atmosphere upon the sea coast; on the contrary, I should think it peculiarly fitted to withstand such influences.

"E. FRANKLAND."

ADJOURNED DISCUSSION UPON THE PRACTICAL VENTILATION OF BUILDINGS.

At the Special Meeting of the Royal Institute of British Architects, March 2, 1863.

THE CHAIRMAN, Mr. A. ASHPITEL, Vice-President, having announced the presentation to the Institute, by Mr. T. Roger Smith, Associate, of one of the blue books relating to the subject of the discussion, suggested, that before the discussion should be resumed, the gentlemen who had sent for inspection the models of their inventions, should explain their construction and use, in order that the meeting might know what was before them.

Mr. M^{c}KINNELL, Visitor, then proceeded to read the following statement:—I have to thank the Institute for giving me this opportunity of describing the apparatus by which I have ventilated many public and private buildings in the metropolis, and throughout the country, within the last few years. It was kindly referred to by Mr. Marrable, in opening the discussion on Ventilation,—a subject the importance of which cannot be overrated, when it is considered that, of all our wants, fresh air is the most continued and the most urgent. We require food three or four times a-day, and drink occasionally, though for a considerable time it is possible to do without either. But we need a supply of air not less than fourteen times every minute, and we cannot exist more than a few minutes without it. And what renders a continuous supply the more necessary is the fact that, in using the air we so change its character, that what we expire is not only unfit to be breathed again, but is charged with a poison which vitiates several times its own bulk. In the atmosphere by which we are surrounded, the Almighty Architect has provided for the continuous removal of the foul air as it passes from the lungs, or has been changed by combustion. In both processes the products become lighter than the air, and rise in consequence, while fresh air rushes in instead. The aim of my mode of ventilation is to carry out this beneficent arrangement in limited and confined areas, by providing for the removal of the air as it becomes vitiated, and replacing it by a continuous supply of fresh air from without. As the air rushes from the pole towards the warmer regions at the equator, so in the difference of temperature of the interior and exterior atmosphere, there is a force available for ventilation sufficient to preserve the purity of the air in every kind of human habitation, if facilities for the necessary interchange are provided. It is well known that a tube fixed in the ceiling of an apartment, intended to provide for the escape of the vitiated air, frequently becomes a channel by which air is admitted instead. I found by experiment that, occasionally, both a downward and an upward current could be detected; the descending occupying the circumference, and the ascending forming a column passing up the centre. These movements were fitful and irregular. But, assuming the tendency to indicate a natural law, it occurred to me that its operation might be assisted by relieving the contending currents from mutual contact, and that a steady flow in each direction might be obtained in comparatively small space, which might be usefully applied to the proper ventilation of buildings. On introducing an inner tube, my anticipations were realised. The light vitiated air passed steadily up the centre, while the fresh air descended through the space between with a velocity that might have produced an uncomfortable draught below. This suggested the addition of an annular flange, or plate, suspended below the opening, and projecting beyond it, to deflect the current horizontally along the ceiling, towards the walls, where, descending, it drives the lighter vitiated air into the centre to pass away. Before reaching the walls, the force with which the current escapes from the flange is so spent, that the air descends imperceptibly, or, as a Clergyman, whose Chapel I had ventilated, rather poetically described it, "like the shadow of a breeze." My ventilator, then, consists of two tubes, one within the other—the central and annular areas being about equal. The inner tube is carried higher than the outer, so that the vitiated air may pass away to leeward, while the fresh supply enters the outer tube from whatever point of the compass the atmospheric current may be moving. The upright form is applicable in upper apartments, or where access can be had to the roof. In lower stories the ventilator is placed between floor and ceiling, as near the centre of the room as may be practicable. When the joists are laid from side to side, an opening is made in the outer wall for the admission of fresh air, which is conveyed horizontally into the annular space of the ventilator, while the centre tube conveys the vitiated air to wherever a vertical shaft can be found to carry it to the roof. This it is sometimes difficult to find in old buildings, though it is easily provided for in new; and various means have been resorted to by which the difficulty has been overcome. When girders come in the way to shut up the through passage, another form becomes necessary. The exit tube is then carried back to the wall, from which the fresh is taken, and the vitiated air got rid of by a flue in the wall, or by some of those expedients to which I have already referred. In many places where access can be had to the roof, instead of carrying both tubes through the ridge, I have preferred to supply the fresh air horizontally, and carry off the vitiated air at the ridge. This mode enables us to select the best point from which to take the fresh air, the coolest side of the building being generally preferred. In churches, where the ventilator is large, I have frequently taken the supply from both sides of the roof, making the openings in the form of dormers, and the turret, for the vitiated air, as much as possible in keeping with the architectural character of the building. Whichever of the modes are adopted, continuous quiet inward and outward currents are established, bringing about, without any of those annoying draughts so generally complained of, a constant renewal of the atmosphere in the place to which the ventilator is applied. Before concluding, I may remark, that I have sometimes found, when the ventilator was applied to comparatively small rooms, that the upward current in the inner tube might occasionally be overpowered by the chimney. In such cases, should any draught be felt, it is easily remedied by closing the valve. I may also remark, that there is no necessity for the room being hermetically sealed, as was stated in the course of the discussion at the last meeting. I have found many cases in which, with door or windows open, the double currents were quite well sustained. This, I confess, was what I had not expected. At the same time, it must be borne in mind, that it is for closed rooms that ventilation is required. The only effect will be, when doors and windows are sufficiently open, to overpower the double-action that, if abundance of fresh air can be endured when admitted from below, both the outlet and inlet will be occupied with air passing away, so that the means of ventilation will be doubled.

Mr. Langstaffe, Visitor, then requested permission to explain the system of ventilation known as "Boyd's System," which had for many years been carried into successful operation, and which he illustrated by a number of models and diagrams. This method is based upon the consideration that it is necessary that the fresh air should be made to circulate through every part of a dwelling, both in summer and winter, in large quantities, and in such a manner that it should never be suffered to remain stagnant in any part, but kept continuously in motion, and at the same time that it should always be admitted at such a temperature and with such a velocity that, although its effects would be readily perceptible, its presence should not be disagreeably felt. With these views Mr. Boyd arranges a fresh air drain of a capacity suitable to the cubical area of the building, leading from the outside wall and opening upwards in the floor of the basement immediately beneath the main staircase, or as near thereto as may be convenient. Over the orifice of the drain is placed a stove, so constructed of iron plates separated from each other as to present a most extensive warming surface at a temperature of about 200° to the body of air continually passing through it. These stoves (see advertisement p. v.) are made either on the principle of slow combustion, as a close stove, in which case they are often kept continually burning during the entire winter season. By this arrangement a large and constant current of moderately warmed fresh air is provided, which soon penetrates the whole of the building. In order to provide for the more effectual withdrawal of the vitiated air from each apartment, Mr. Boyd has recourse to the chimney stack, as offering by its constant warmth the best assistance to the natural effort of the air to escape at the highest point. The ordinary flue is divided by a plate of cast iron into two parts, one to carry the vitiated air from the upper part of the room; and the other, the smoke from the fire, the warmth of which, being conducted through the iron plate to the ventilating flue adjoining, materially assists the ascending power of the escaping current; the iron plates for this purpose are made each to suit four courses of brickwork, they are united to each other by a strong wrought iron tie piece which binds the front and back brickwork of the flue together; this tie has a groove on its upper and under edge, into which each plate is dropped as the work is proceeded with; the ties also are so caulked at each end that the stability of the stack is increased rather than otherwise; by this arrangement also there is no need for increasing the bulk of the chimney stack to accommodate the extra flues, for the ventilating flue by its two tiers of plates (see advertisement) occupies only the space which would otherwise be taken up by the ordinary brick "withe." The admission to each ventilating flue is either by an Arnott's valve, a simple iron grating in the upper part of the room, or a tube leading from the centre of the ceiling. The top of each flue is stopped off below the termination of the smoke flue, and the vitiated air issues through louvres fixed on each side of the stack. Independently of the mode of warming and ventilating the main staircase of the building, it is advisable that each apartment should have the means of supply and withdrawal of air at pleasure; and for accomplishing this, the grate known as Boyd's Hygiastic Stove offers the most available means. This grate has an open fire, and does not differ in appearance from other grates; the principle of its construction is to allow the cold air to pass under the hearth and round the body of the grate which holds the fire, and it finally enters the apartment through a longitudinal grating or perforation at the top of the stove front. The air thus admitted being of a higher temperature than the air of the room, the moment it is free it rapidly rises to the ceiling, displacing in its passage an equivalent amount of the colder air at the lower part of the room, which is drawn through the fire into the chimney, thus a continuous circulation is maintained, and the fresh warmed air completely fills the apartment. It is also worthy of observation that if the principles on which Mr. Boyd has based his invention were adopted as a rule in modern buildings smoky chimneys could not occur, nor would these cause any necessity for the disfigurement of our buildings by the unsightly cowls and other monstrosities that are supposed to *create draught* and remedy smoke—the terminations of our chimneys might, in fact, be left perfectly open, and finished as the taste of the architect directs, being made an ornamental feature, instead of being left to the tinman.

Mr. Baker, Visitor, then asked to be allowed to give an explanation respecting a ventilator (Howarth's), noticed by Mr. Marrable in his remarks upon the last occasion. He had rather a delicate task to remove the impressions that have been fixed that Mr. Howarth was the inventor of this system. That gentleman unfortunately forestalled him at the International Exhibition. He had been refused a place there as representative of the late Mr. Chadwick, and the consequence was, it has been a great deal more known through Mr. Howarth. Mr. Chadwick was dead, and he was carrying on the invention for the widow, and had been the means of introducing it in London. Mr. Howarth had never obtained any patent, as the Lord Chancellor decided the priority of invention to Mr. Chadwick. Mr. Baker then explained the working of the model he had on the table (see Advertisement). Some for smoke had been up since 1857, and they had never been choked, nor had they been swept. For ventilation, he was now putting up two at the Baltic Coffee House

Subscription-room. The first was put up as an experiment, and the gentlemen collected there in the afternoon (sometimes 400 or 500) were so well satisfied, that last week he had fixed another. They are two feet in diameter, and answer admirably; he could not point out a better place in London where they can be seen working than that, although at Woolwich Arsenal there are fifty or sixty, and whenever there is ventilation required, or smoke to be cured, they sent to him. They have one over the sun-light of the officers' mess and billiard rooms, and they have all been found to answer in every way. In answer to a question: It is self-acting, and not only not liable to injury in high winds, but acts better at such times. The size required depended upon the number of people congregated. He had sent one for the assembly-rooms at Gravesend, which accommodates from sixty to one hundred people, and that was about 16 in. or 18 in. diameter, and he had the testimonial that it is very satisfactory.

Mr. Marrable, Fellow, said that he had brought Mr. Howarth's ventilator under the notice of the meeting because he had seen it at the International Exhibition, where it had struck him as having some merit. Of course, he had not seen Mr. Chadwick's, simply for the reason that it was not there. The two seemed to him to be perfectly the same in object and action. As to which gentleman the merit of the invention belonged, he was not in a position to decide. Whether there was any difference between them, the meeting would be able to judge. It did not appear to him that there was any.

Mr. J. W. Fraser, Contributing Visitor, stated that he had a ventilator in action in his house with which he was well satisfied. It was exceedingly simple and inexpensive, yet perfectly answered its purpose—that of admitting fresh air into the room when the doors and windows were closed,—and without producing any unpleasant draught. This ventilator was placed at the side of a window, and might be put behind the curtain. It was simply a tube made of zinc, communicating with the outer air under the floor, and rising about five or six feet, being open at the top with a regulating valve within it; the current of air, having an upward direction, was not perceived by persons standing within a yard of it.

Mr. Marrable considered that opening the top of the window would answer quite as well.

Mr. T. Roger Smith, Associate, stated that he had put up half-a-dozen similar ones in a school that he had built, and they acted excellently. He said also that with regard to the blue book which he had had the honour of presenting to the library, he wished the members to be in possession of it, because it contained the only record which had come under his notice, of experiments as to the condition of the atmosphere of a room with a fire burning. In the warm days of summer ordinary dwelling rooms can be sufficiently ventilated by opening the window; but as soon as the climate becomes sufficiently inclement to render open windows unpleasant, recourse is had universally to open fires, and in them there is a powerful ventilating agent. That report, which was drawn up by scientific men (not practical builders), contained conclusions which, probably, the members of this Institute would not altogether fall in with. But he thought the premises very important and very satisfactory. The work contains details of actual experiments, shewing that in a room, where the air being undisturbed by interfering causes, the ordinary results of lighting a fire are allowed to establish themselves, there is immediately in front of the fire-place a column of heated air rising to the ceiling; this warmed air spreads along the ceiling, especially towards any cooling surface; it descends the opposite walls, it creeps along the floor of the room towards the fire again, part of it enters the fire to support combustion, and the remainder recommences its circuit again. It is very clear, if that is the case, that there is a circulation established in the room; and consequently, that if the vitiated products are not speedily got rid of, they will be mixed up with the fresh air of the room. Therefore it is of great importance that an opening, such as Arnott's valve, should be used for carrying off the foul air, providing a corresponding contrivance can be used for admitting fresh air. He would mention one contrivance which had not been previously alluded to, which he thought does this portion of the duty as well as Arnott's valve, and without its disadvantage. If in constructing a chimney-place—it might be done afterwards, though better done originally—a flue be built by the side of the chimney flue (a chase cut in the wall to represent a flue will answer the purpose), and the opening of that be constructed just underneath the fire grate and above the hearth, and if the upper end of the flue open into the room by an opening similar to that of an Arnott's valve, immediately an inverted syphon is produced, of which the chimney flue is the long one, and this air flue the short one; and the consequence is, that as long as there is a fire burning in the grate, a strong backward current is created in this flue or pipe, which draws a large amount of air down and discharges it into the fire, that current being to a large extent fed by the vitiated air which rises to the ceiling: the advantage of this plan over an ordinary opening into the chimney place is, that when the fire is not burning, a return current cannot well occur, and so the opening cannot vomit forth smoke as the Arnott's valve does. He could testify, from having introduced this syphon and seen it in action, to its very good effect. The first he had seen was in a small room belonging to Professor Woodcroft, who recommended it to him. That was a small room used as a smoking room; and it was hardly possible, when one or two persons were smoking, to detect the slightest smell of tobacco. As a counterpart to the foregoing he would mention one method of admitting air, which had not been referred to, the method for which Mr. Varley received the premium of the Society of Arts many years ago. He did not think this method has been frequently put in practice. He proposed to place in an ordinary dwelling room, at the level of the cornice, a hollow moulding, the face of which should be formed of perforated zinc, with one or more openings communicating with the outer air, opposite which openings this zinc was to be left unperforated. The result was stated to be that the air comes in, as it always will do wherever openings exist, and is thrown right and left by the unperforated plates, and travelling along the hollow channel filters gently into the room. He could state that it acts very well indeed in a model, and seems to promise a simple and agreeable means of admitting air. The next best method is the Sherringham valve, a contrivance which he knew is a great relief to the sense of heat in small dwelling rooms, especially when lighted with gas. But the Sherringham valve is objected to because of the draught, which it certainly does at times occasion; and he was inclined to think that the method of Mr. Varley will be found to be more practically useful. It is described in a MS. paper in the library of this Institute.

Mr. **Francis H. Fowler**, Associate, wished to call the attention of the Institute to a stove lately invented, and which he did not think had been under consideration during this discussion; it is called "Batty's Ventilating Fire Grate." He had himself used it, and found it to act very successfully, and thought it worthy the attention of the Institute. The system is to supply, in a simple but inexpensive manner, pure external air direct to the fire grate. This is done by introducing the air beneath the grate by means of a tube, constructed between the joists, communicating with the external atmosphere. This tube is divided into three separate currents by means of flat bars; one of these currents is directed immediately under the grate for the purpose of supplying the fire; by this means the most perfect combustion takes place, and the smoke is compressed and burned; so perfectly indeed does this act, that when a candle is placed in front of the fire, the flame remains perfectly upright, there being no draught towards the grate, shewing that no part of the air introduced for the ordinary purposes of respiration is drawn away to feed the fire. A second current is directed into the room itself immediately from the external atmosphere, and is introduced into the room by means of a valve placed at the side of the fire grate. A third current is conducted to a chamber formed round the grate, and having become heated, is admitted into the room by a valve, as before, upon the opposite side of the grate, so that a room is supplied at pleasure with pure warm or cold air to any extent, and by opening or shutting the valves the temperature can be raised or lowered at pleasure; in fact it is quite under control. The vitiated air escapes by means of an Arnott's ventilator fixed near the ceiling, and leading into the smoke flue. There is no draught, and the supply of pure air is continually going on, while the vitiated air is expelled, as it appeared to him, upon natural principles. he had been in a room where a number of persons were smoking, and the action of the system could be seen by the immediate removal of the heat and smoke when the valves were opened. The principle can be applied to most stoves in use, and he believed it to be the only simple and natural system by which warmth, combined with pure ventilation, could be obtained without the aid of artificial means or complicated machinery. He was sorry the patentee was not there to-night to have afforded the Institute more detailed information, but he would recommend the members to visit the establishment a few doors the Strand side of Temple Bar, where the system is in daily operation. He was sure the result would be that they would consider it a most economical mode of warming and ventilating, and at the same time very effective.

Professor DONALDSON, Fellow, said that he had to offer but very few observations, as he had come to learn. He was prevented from being present on the other occasion when the subject was commenced, and was not therefore prepared to refer to it, so would now merely say a few words. He thought they must not treat this as a partial problem, to amend the ventilation of an individual room here and there, but as what will be the best application of a simple system, which will give one uniform ventilation, not only in this or that room, but throughout the house. To maintain a good system throughout an entire building is what was required. In a public institution he had been called upon to remedy a very great evil as to the different temperature in the various rooms. This he had found to arise from each having its own distinct one. It occurred to him that this arose from the absence of the common intercommunication which should maintain one general temperature throughout. He made large openings over all the doorways, the same temperature was equally distributed, and the evil was remedied. They did not want partially to alter one room and then another, and so have many different states of the air for various parts; but to introduce one general system, and if such could be realised for the whole, he thought that to be the great desideratum in the consideration of the present question.

Mr. JOHN W. PAPWORTH, Fellow, admitted the importance of the questions involved in seeking to subject successfully a suite of rooms with fires to any system of artificial ventilation. He had learnt, from the fifty years of experience enjoyed by his predecessor, that no system could be expected to answer in a suite, unless every room was kept precisely similar to the others in every condition of fire, closed window, open door, and amount of use. On the same authority, he was persuaded that when fresh air was supplied to the rooms of a house, and the foul air taken away, a course which, in ordinary cases, gives general satisfaction so long as the doors were kept open, is to supply the passages of the building with a large quantity of air heated to 60°, for no more can be calculated to result from any of the present approved systems of heating. But when the doors are kept shut, the passages begin to get foul; and then a ventilation is wanted at the top of the staircase—as soon as it is put up the chimneys begin to smoke. The practical difficulty evidently admitted of no compromise; either the ventilator or the fire must be abandoned. If the doors are kept open, and there be no provision but the fire for taking off the foul air, the supply to the fire is simply a draught of air at 60°, or rather lower: and he could state that where a furnace in a large institution had a supply of fresh air into it, the result was, that until the furnace grate was closed by an air-tight door, the smoke preferred to get into the institution rather than up the chimney; as soon as the tube for supplying fresh air was closed, the chimney was triumphant. Mr. Papworth remarked that the invention mentioned by Mr. T. R. Smith was really due to Mrs. Varley, who received for it a medal from the Society of Arts, about 1846, and he declined to accept the theory of the diffusion of heat from a fireplace in every room, as propounded in the paper cited by Mr. Smith, for a room in Great Marlborough Street never seemed to get any heat in winter at the distance of ten feet from a good fire. He suspected that a great portion of the meeting had heard about Dr. Reid, without having had the opportunity of knowing what were really the views of that practitioner. They might be divided into nine dicta, viz:—1. The amount of air supplied in general to crowded buildings is far below the standard requisite for the preservation of health. 2. The ingress of air by an extensive system of diffusion is the great desideratum in practical ventilation, and the most difficult to be secured where special provision is not made for this purpose. 3. A sustained power can alone regulate and maintain proper ventilation in crowded buildings, or preserve it from the influence of external currents. 4. Air, entering a crowded building, ought not to be admitted by ordinary windows, but by special apertures and channels, in which it may be tempered to any extent required. 5. The milder and more extensive the heating apparatus, the less injurious is the effect on the quality of the air supplied. 6. The products of combustion by any means of artificial light should be removed as directly from the general atmosphere as the products of combustion by any means of artificial heat, when not necessarily carried off at once by the general movement of the air. 7. In any system for artificial light, the great desideratum is the imitation of the diffused light of day, not the concentration of great power in one or a few lights. 8. Illumination at the cornice, at the ceiling, or above the ceiling, by a special system harmonizing with the general architecture, and incorporated with it, would lead to important practical results, and admit of the entire exclusion of products of combustion. 9. A low roof, combined with a powerful reflection of sound there, and a floor highly absorbent of sound, with apertures through which it can escape, tend largely to improve the communication of sound. Those nine dicta seem to have comprised the basis of Dr. Reid's practice when Mr. Papworth last saw him (about eight years since), but of course their application to any building would depend upon Dr. Reid's ingenuity. There was one point to which Mr. Papworth wished to request the attention of the meeting, viz., whether the ventilation and illumination of a private apartment should, or should not, be treated in the same manner as the ventilation and illumination of a public room. He begged to observe that a great portion of the difficulty of securing attention to ventilation arose from the ladies. He did not know what conformation of olfactory organs might be peculiar to the sex, but it must be admitted that from the attempt to stifle the consciousness of being in a badly ventilated public room, by more powerful essences of stinks, down to the resolute exclusion of air from the sick room, the nursery and the bedroom, he knew of scarcely any lady but Miss Nightingale upon whom the least reliance in the cause of ventilation could be placed. With regard to one suggestion made at the last meeting, it would be worth while to hear the experience of gentlemen present as to the point where air should be admitted from the wall, *i. e.* at what height from the ground. It might be assumed that the level of the underside of the bad air in a dining room was about five feet from the floor. In providing some labourer's lodging-house accommodation, he had used a system suggested by Lord Shaftesbury, which was very like a horizontal Watson: the end of the double tube was masked by a patera fixed an inch and a half from the ceiling, so large that the tenants could not see the hole in the ceiling—it answered, and the chimneys did not smoke. But though that might be very well in such a place as he had to deal with, it would not answer for a dwelling house, as scents would rise through the floor; in ventilating a smoking room, it had been found necessary to make the whole double tube in air-tight tin, or zinc, work. He thought no reasonable individual would, after the experience of the Houses of Parliament, think of admitting fresh air through carpets—and he begged the meeting to remember that ladies would have carpets planned to the rooms, or else would have floor cloth over the spaces not carpeted. Floors papered by order of the lady of the house were too common for him to mention. He left his "mad mediæval friends" in the meeting to deal as they best could with the attack upon open roofs in churches, so indirectly but powerfully urged by Dr. Reid, whose objection to Coronas was fairly to be tried by the present chandelier in the room in which the meeting was sitting at the moment. And, no doubt, they would be glad to retort upon Dr. Reid, that all his experiments at Westminster were not practically so satisfactory in the opinion of some people, and not so economical in the opinion of every one, as the box of winnowing sails which once stood over the centre of the old House of Commons, and which was worked by one labourer at the usual weekly wages. In conclusion, he would mention, for the benefit of his fellow-practitioners, that the introduction of two four-inch rainwater pipes into a dining room flue, each having a heel into the open air, and an elbow to a damper in the wall of a room above, had kept those rooms dry, and even comfortable, during the last three months, although in a very exposed situation. His own experience corroborated that of every previous speaker—no apparatus for ventilation in any place was worth much if it were not entirely self-acting and incapable of being choked or reversed. And no better mode of warming any place existed than that of admitting warm fresh air. If there was any public room worse than the Chambers of the Legislature, he thought that the great Reading Room of the British Museum might be preferably indicted for the most puzzling series of draughts that could possibly be imagined—yet they did not arise from want of forethought on the part of the architect, and, in Mr. Papworth's opinion, might easily, but not prettily, be checked. The means, however, lately adopted, and still in operation, seemed to have resulted in letting every fog into the room, which previously could be used (when in the adjoining rooms no one could read at all) because the eye of the dome was above the top of the fog-cloud; and certainly, till lately a fog in the room was a rarity. The height at which the warm air entered, viz., about fifty-four inches from the floor, was, perhaps, too near the heads of the readers, as the draughts threw the hot air directly into their throats.

Mr. H. H. Collins, Associate, said, that it was the duty of every member of the Institute, in consideration of the practical value of the subject, and in deference to the kindness which prompted the able composition of this paper, to give the benefit of his individual experience and practice. All the methods which had been submitted were but modifications of a system of ventilation by means of a shaft, vertical or horizontal, which after all converged to that which, differing only in kind and position, our practical experience convinced us was about the best means in the architect's power for securing a perfect and inexpensive system of ventilation, viz. the ordinary chimney flue or foul air extracting shaft. The theory of the action of air in chimneys followed the law of the Archimedian Hydrostatic Theorem. If we imagined the air in a shaft to be a solid body immersed in the ocean of the atmosphere we should find that when the air inside and outside of the chimney shaft was of the same temperature, equilibrium took place, *i. e.* the air remained stagnant, because the downward was counteracted by the upward pressure. If the air in the shaft *was heated,* it suffered expansion and was expelled—it was of less weight than it was before—and the external and internal columns no longer balancing each other, the warmer or lighter air was forced upwards from below, and its place supplied by *colder* or heavier air. In other words, if the exterior column of air was heavier than the internal one there would be an up current, if lighter the internal air became the heaviest, and sunk into the room, and there would be a downward current therefore as long as the air in the flue could be rendered expansive and lighter than that of the exterior. A motive power and extracting flue, such as was mentioned by Mr. Papworth, was produced. This being obtained, the architect must next seek to render its application self dependant, inexpensive and simple in construction. In some model lodging houses, now being erected in Commercial Street, Whitechapel, from his designs, the system he had adopted was founded upon the principles he had just stated, and without incurring a shilling extra expense to the cost of the building. The great difficulty, and well recognised by our experience in ventilating buildings of this nature, was the repugnance of the inhabitants to have ventilation at all; like many other subjects they declined to be ventilated at any price. The admission and egress of fresh or foul air was stopped up in every conceivable way; brown paper, rags, woods, &c. were brought into action; and he knew of one instance where the air was carried away through the ceiling, of a paper cornice quite round the room being improvised for the prevention of its escape. The living rooms are situate one over the other, and in each of their fire places he had used one of "Cundy's Model Lodging House Stoves," selected from many others as being the most economical and effective of its kind. He would remark, *en passant*, that besides other advantages this stove had *this* great feature to recommend it: all portions were made to slide, and could be replaced, if injured or broken, at the small price of 1s. 6d. Taking advantage of its construction, it having the oven placed beneath the fire grate, and the flame being made to pass right under and to impinge in its progress upon an iron plate, he had formed his ventilating arrangements. A flue, 4½ by 14, was built up from top to bottom of the building, and running parallel with the smoke flue of the living rooms; at each floor the air in the ventilating shafts was rarified by coming in contact with the iron plate, against which a continuous flame impinged, the foul air was by this impulsion, as it were, pumped out. To these flues were connected air chambers from the other rooms, the method of doing which was shown by the accompanying illustration. He drew or pumped the foul air away by an opening about three feet from the ground, and connected with the ventilating flue; this opening being fitted with an iron air brick of spiral design, covered with short, sharp point, and otherwise constructed so as to prevent the possibility of being injured or interfered with. So much for the means of extraction. The ingress of pure air was, perhaps, the most sensible difficulty to be overcome, for if there was the slightest draught it was condemned, and all openings would, in a building of this kind, certainly be closed up. He had therefore applied the axiom, "Ars est celare artem," and had admitted the air between the parting beads in the head of the windows, which, he hoped, would escape detection. It flowed in through folds of fine zinc gauze, (which could be taken out and cleaned if necessary); and by the laws of diffusion of gases mixed with the impure exhalations and then gently and evenly sunk down, and was drawn away by the flue. As long as the ventilating flue was in action, *cold* air must come in, and the system was therefore, perfectly self-acting. Such as it was, he submitted it for the consideration of the Institute. Mr. Marrable thought that a system of this kind occasioned "cold douche." His answer was—firstly, that a cool head, even to a mechanic, was an object; secondly, that it was nearly impossible to have any good, without some slight mixture of evil. Thus he compared the system of this admission of air to brandy and water, which, if partaken of strongly mixed, is calculated to produce baneful effects; well diluted, the mixture becomes innoxious, and even beneficial. This was what he proposed:—to dilute the noxious atmosphere, and deprive it of its power of harm. With regard to Arnott's ventilators, he must add his testimony to that already given, as to their inefficiency. Mr. Edwards said that, if the register was properly regulated, not any of the ill-effects complained of would take place; but this *requirement* was itself alone a condemnation of the valve. Neither themselves nor domestics could afford the time to be continually watching the registers; and if there were many flues in the house, they would certainly absorb all their attention. All who have used them are aware that, at times, smoke and dust are inconveniently puffed into the apartment, with the accompaniment of a continual flapping. The majority of the inventions before us were really useless in practice—some on the score of expense, and others on account of the difficulty of application without destroying the building, and some from being truly non-efficient. Doulton's, Boyd's, and others of this nature, were failures. Without a continuous upward draught, they could not have any expulsive powers. He would now briefly call the attention of the Institute to an invention which was calculated to smooth the way for effective ventilation, designed by the late Mr. Billing, a Fellow of this Institute. They all knew the nuisance of a smoky chimney, and the difficulty in ventilation of encountering a down-draught or descending currents of air, destroying all comfort, and disarranging all plans. Mr. Billing devised after much expenditure, experimental research and lengthened study, the Terra Cotta Terminals which bore his name. His first endeavour was to obviate the evils which have been touched upon this evening; his next was to exterminate, as far as possible, those dreadful excrescences (but temporary and expensive expedients at the best, being corroded in a few years,) known as "Tall-boys," "Cowls-pots," &c.; and to produce a pleasing, effective, and inexpensive chimney terminal, applicable for smoke and ventilating flues. He ventured to state that Mr. Billing had perfectly succeeded, as most of the principal existing buildings and recent modern erections could testify. The terminal was designed to suit all styles and to adapt itself permanently to most circumstances. The invention itself consisted of a truncated cone, with divisional withes, and its rationale was this, the deflection of the wind caused it to pass rapidly upwards, and created partial vacuum permitting the smoke to emit itself in a jet-like form, the divisions preventing the smoke finding its way by back draught down the adjoining flues. Any member could witness the effect of these terminals by a glance at those fixed on Somerset House, in an exposed position. One other invention Mr. Billing perfected before his death; it was designed to obviate the inconvenience so often experienced of a down draught, and emission of smoke into the apartment, caused by alternations of temperature. The chimney or ventilating shaft might draw very well all day long, when just towards evening, at the time when the fire was most required, the smoke commenced to descend, to the great annoyance of the inmates of the house. Mr. Billing named this invention a "Chimney Throat and Valve;" its rationale was to contract the flue by an iron throat valve to its minimum dimensions, and to condense the whole heat of the fire to one point, the contraction preventing cold air penetrating, and the heat expanding the air in the flue, and also the smoke, and allowing it free egress. This valve could be regulated at pleasure. A simple turn of the knob attached to it was all that is required. He could answer for its efficiency, some hundred having been fixed without any failure. It had only one fault, and that was, that it required regulation, *but still not attention.* The application of these two patents, however, would ensure us a means of ventilation, would secure us against our designs being disfigured by "horrible forms," and would certainly preclude our being annoyed by complaints of smoky chimneys. The patents were not infallible, but if fixed with proper scientific knowledge and attention seldom failed to produce the required effect. A few words more, and he would conclude. If throat valves, on account of expense, were not employed, then he would advise the members to form the throat of the chimney, as he had done at the Model Lodging Houses and many other buildings with great success. He had to thank an Irish labourer for the information, who told him how to "bother the smoke," which was really the best explanation of the reasons which dictated this form; it "bothered the smoke," and allowed a free upward draught. Generally, he was of opinion that all ventilation must be adapted to special circumstances, and was liable to certain fixed laws, which if but attended to, with the aid of common sense, would render the vital and important subject of ventilation an easy task to understand and conquer.

Mr. C. H. Smith, Honorary Member, said that before the discussion was closed, he wished to offer a few remarks: he was disposed to think the whole subject very considerably overrated in importance. When he was a lad, he knew of the word *Ventilation*, by finding it in Johnson's Dictionary; but as for finding it in any writings connected with architecture, that was quite out of the question. Jones, Wren, Vanbrugh, and other architects of those days never thought of it, and yet people were as well in health then as now. Many ingenious theories, with scientific pretention, have been practised in all ages; thousands of well disposed persons put the most implicit faith in great names, and numbers of men of high intelligence follow the popular current. If an epidemic prevail in a certain district, it is sure to be attributed to over-crowded lodging houses, bad drainage, or want of ventilation. If unpleasant smells are the cause of so much evil to health, strength and life, none but criminals should be employed to empty cesspools, drains, sewers, and other loathsome works, for if a little nausea be unwholesome, a great deal may be destructive; yet the men thus employed are generally as strong, healthy and long lived as the countryman who works in company with bees and butterflies in the midst of meadows, orchards, and flower gardens. The over-charged graveyards, and old burial grounds, are so full of human remains, half-decomposed, that on opening a grave, the stench is beyond description; nevertheless, the grave diggers, who are constantly at such work, escape the contagion, and in many instances live to a very advanced age. Something very similar will apply to the anatomist, engaged during many weeks upon the putrid remains of an animal, when at times the smell is inconceivable to those who have not experienced it, yet these gentlemen enjoy their lives quite as long, on the average, as other people. Mr. Smith also stated that in some of the most confined and dirty neighbourhoods, where cleanliness seemed to be neither known nor thought about, he had often observed with astonishment a host of little fat, rosy-cheeked, chubby children, apparently as if they flourished best in their dirt; and, in fact, many of them were such children as the aristocracy might be proud to own as their offspring. During the last few years a great deal has been said and printed about the importance of a great number of cubic feet of air-space for each individual in the wards of hospitals and infirmaries. In the additional storey added to St. George's Hospital, a few years since, the rooms are from fourteen to fifteen feet high, so as to allow about four times the cubic space for each patient more than was formerly considered amply sufficient: if those rooms were only half the height, they would be equally healthy, under certain conditions of ventilation, or frequent change of air; the magnitude alone of a room has little to do with the sanitary condition of it. Man, in common with all air-breathing animals, if kept in a close room, would certainly prematurely die for want of fresh air; but whether the animal be confined in a box, or in a place as large as St. Paul's, if the air were not changed, its existence would merely be a question of time; if it could not breathe freely, suffocation and death must ensue. To insure health and comfort, the fresh air should be first warmed or cooled, according to the season of the year, before it is introduced into the apartment. A very remarkable instance of small space and good ventilation is the little apparatus generally used by divers, or men who work under water, during six or seven hours without intermission; it consists of a sort of helmet a little larger than the head, thoroughly air and water-tight, the weight resting on the shoulders of the diver; this contrivance may be considered as a diminutive room, which the man carries about with him; a tube with force pump supplies him constantly with fresh air, which drives out the vitiated air round the man's shoulders. This shows that the size of rooms has very little to do with sanitary science. Nothing is more easily moved or disturbed than air of all kinds, in fact it is extremely difficult to confine or retain it for a length of time; it will find its way through a brick wall of almost any thickness; a vessel several inches thick, formed of any of the usual building stones, cannot be exhausted by the most powerful air pump; and large bladders filled with either hydrogen, oxygen, or carbonic gas, and not used for several days, will be found on examination to contain scarcely a trace of anything but atmospheric air. Mr. Smith remarked that the Lecture Theatre of the Royal Institution in Albemarle Street was one of the most comfortable places he had ever been in. He had long been accustomed to attend lectures there at all seasons; on certain occasions, when Professor Faraday lectured, it was sure to be filled in all parts. Cardinal Wiseman recently gave a lecture there, when the theatre was filled beyond anything he had ever seen; and yet there were no complaints of want of air, suffocation, nor of chilling draughts in any part of that crowded assembly. It may be worth while for an architect to investigate the simple, straightforward means adopted for letting the air in and out of that large theatre, where the fashionable as well as the learned assemble to listen to the discourses of many of the brightest ornaments of scientific society.

Mr. Morris, Fellow, thought Mr. Smith's remarks had somewhat fallen in with his own reading on the subject; so far as they aimed at correcting a tendency to exaggeration. Looking, he said, to the details of human respiration, it appears that about 18 inspirations, of 15 cubic inches, take place per minute, making together 270 inches; and as the quantity vitiated is assumed to be three times that inhaled, we have 810 inches, or nearly half a foot cube, to change for each person every minute. Now a briskly burning fire in an ordinary grate, with a flue 9 by 14 (that is 10½ inches superficial) causes air to ascend at something like five feet a second, and affords a ventilating power equal to the sustentation of 250 people. With rapid combustion, bringing into employment the total capacity of the flue, it would, of course, be useless to make further openings into it. Though Arnott's valves were, undoubtedly, valuable accompaniments to Arnott's stoves, which created an ascensive impetus in the flue, beyond their own requirement, or power of supply, and rendered the action of the valves beneficial and certain. It had been noticed that expired air, on leaving the mouth, rose rapidly towards the ceiling, but that was not so much from its temperature as in consequence of the great amount of hydrogen (the lightest of all substances) with which it was combined. The electric condition of air supplied to apartments was of great importance; and some of the apparatus submitted were calculated to furnish it, in a thoroughly deranged state: dried and heated by contact with hot iron, and charged with qualities of the most pernicious character for human respiration. It was quite necessary to follow, in some form, Dr. Reid's example at the Houses of Parliament, to temper the air with moisture as well as heat, so that while it had power to sustain the vapours of respiration, it should also be hygrometted to prevent excessive and injurious exhalation from the body. He tendered these remarks as indicating some of the governing principles that had not been prominently touched upon in the discussion.

Mr. Haywood, Fellow.—I differ from the observations made by the two last speakers, as I do not think we can pay too much attention to the subject of ventilation; but what I fear is that we shall attempt to get ventilation by means which are so complicated that it will never be effectual. That is the fear I have before me, and such has been the principal defect of most of the systems adopted for large public buildings; and although I believe no system for a large public building can be laid down which is not more or less complicated, yet it is certain that the simpler it is the greater amount of satisfaction it will be likely to give in the long run. As to what has been said about the difficulty of retaining a specific gas in a vessel, I may observe that no material is impermeable, not even glass, for if you exhaust an iron tube, close it hermetically and leave it for a sufficient space of time, you will find that the air has got through the pores of the iron and filled it; that is a well-established fact. If it were not for the law of diffusion we should not be able to exist probably in any part of this room at the present moment. There is no doubt that the foul gases are specifically heavier than the ordinary atmosphere; but the law of diffusion is such that if you invert one bottle on the top of another, having put into the upper bottle the lightest gas you can put into it, and the heaviest gas into the lower bottle, and if you then join them together at the neck, leaving a free communication between them, in the course of time you will find that diffusion has taken place, and that the air or gas in the two bottles is of the same specific gravity and of uniform quality. That was first scientifically investigated and proved as a law I believe by Professor Graham, and to that law is attributable the uniformity in the quality of the air which is found in any part of the same apartment, whatever may be the mode of lighting or the extent of occupation. I do not believe, with regard to the ventilation of ordinary dwellings, that in any ordinary-sized houses (say of from ten to fifteen rooms) that any scientific or well adjusted system of ventilation will become general, as it will be too expensive, and also subject to too many uncontrollable but disturbing influences. Therefore you must have recourse to some simple measure, which will relieve you of the worst of the difficulty.

I have already spoken of the fitness of Arnott's valve for this purpose, and I cannot help saying if some such system does not at all times fulfil the object, then that opening the window a little is about the best mode I can think of when the deficiency in ventilation is felt. I believe I am correct in saying there is no public building in existence, however well it may profess to be ventilated, in which there is not left a controlling power over the window. We have this evening heard Dr. Reid's "dicta" read to us, and it is quite clear that he objects to windows being used as adjuncts in ventilation, and, if left to him, that he would nail them all up, and if so, it would not be wonderful if some day the inmates in a building so heated by him had been stifled because his system was temporarily deranged or inoperative; but doctors differ, for in the year 1854 there were some of those periodical committees of the Houses of Lords and Commons on the ventilation of the Houses of Parliament, which, it is my impression, will recur every few years, and before whom Dr. Faraday and Dr. Arnott, Mr. Goldsworthy, and others were examined; as might be expected, there was a wide difference of opinion upon certain points; but there were very strong opinions expressed upon the propriety of maintaining a controul over the windows, and in various cases suggestions were made for opening windows, enlarging windows, and so on; and it was given in evidence by Members of the House of Commons, that during the sittings the windows were frequently opened in summer with good effect; and, indeed, it is in the summer that the greatest difficulty is experienced in ventilating rooms without opening windows on account of the similarity there is in the temperature of the internal and external atmospheres. I think the gentleman who last spoke is wrong as to the amount of air a man vitiates. According to medical men, the very lowest quantity of air which an adult vitiates is five cubic feet per minute, and recent investigations seem to shew that double or treble that quantity is the proper quantity to be supplied to adults. In one of the blue books, called, I think, the "Report of the Commissioners upon the Warming and Ventilating of Buildings," published in 1857, a book of which it may be said that it contains a great deal of chaff, but at the same time a good deal of wheat, there is recorded a variety of experiments of considerable value, one of which was as to the quantity of air which passed through a chimney when the fire was burning, and the doors and windows were in the ordinary condition. There are, of course, strong currents of air through the doors and windows of rooms when there is a cold external temperature and a warm internal temperature, and the Commission found that in rooms 30 feet long, 23 feet wide, and 12 feet high, with good fires burning in them, there was passing through the chimneys from 600 to 900 cubic feet of air per minute. In others, with stoves of a different class, they found 1,000 cubic feet of air going up the chimneys per minute, the rooms being of the same dimensions as those first named, and as the cubical contents of each of those rooms were under 9,000 feet, it will be seen how frequently the air was changed by the action of the fire. Wherever therefore there is an old-fashioned English fire, with doors and windows in the ordinary state, which is, that air is gradually coming through them and, by virtue of the difference of temperature, moving about in various ways, mixing with warmer air and diffusing itself all over the room, it will be seen what a powerful ventilating agent that open fireplace is. One word, before sitting down, as to the air going upward from an orifice in the side of a room, I believe it is a physical impossibility that it could do so, for, setting aside the law of diffusion, I believe air is subject to identically the same laws as water, and therefore nothing but a force pump could send it up to the ceiling if it entered under the conditions described. Indeed, the colder the air outside, relatively to that inside, the more quickly would it fall down to the floor instead of going up to the ceiling. The fundamental principle in sound ventilation is to let out the hot and foul air at the upper part of the room, and introduce the fresh and cooler air at the lowest part.

The Chairman said, that he should now call upon the gentleman who opened this discussion to say anything he might wish in reply. But, before doing that, he could not but remark that they had spent two very pleasant and profitable evenings, in the course of which here had been a great deal of new and valuable matter brought forward. He might observe that he thought one great failure of artificial ventilation was, that it was generally on too small a scale. He saw ventilating gratings frequently, the superficial area of the openings of which were 2 or 3 inches long by perhaps a quarter of an inch wide, perhaps not six inches in area altogether, and these are expected to do the work of a flue 9 inches by 14 inches, or something like 126 inches super. That seemed to him certainly a mistake. And he thought another point most indisputably proved was, that hot air rises and cold falls. In a hot room with the door shut, if somebody opens the window at the top the air will be found to draw out; and then, as the room becomes partially a vacuum the cold air will come in, and this may be proved by drawing down a blind in front of the open sash; the holland will be alternately drawn out and then swell in like a sail He thought that, for ordinary ventilating purposes, the chemical question of the mixture and the interpenetration of gases was hardly to our purpose here. After all, he thought the great error was, in ventilating, to apply the same remedy to every disease. Many inventors had perhaps hit upon a very valuable thing for certain conditions of ventilating, and they will insist in applying it to all conditions, and hence some great failures. But they should not throw cold water upon every invention because it did not succeed here or there; nor, if the father of the system might be too fond of his own invention, and push it too far, assume that therefore they should stay where they were, as the Turks do, and make no move whatever towards progress or improvement. A new theory with regard to respiration is said to have been brought from Germany lately. A gentleman there says that animals of every kind ought to have as little air as possible during sleep, and that it is a great mistake to ventilate bedrooms. He instances the conduct of almost all animals going to sleep. He says the dog and cat stop their nostrils, and try to get as little air as possible, and that even a bird tucks its head under its wing before going to sleep; and thus it happens that when one gentleman is found pushing his theory very far one way, another comes forward and pushes it still further in the contrary direction.

Mr. Marrable said, he had little to add to what he had said before. With regard to the value of an opening by the side of the window, he believed it had no more effect than an open window would have, the only difference being that it was concealed behind the window curtain. It often happens when persons go into a room, especially ladies, that they look round to *see* if there is any draught, and if they see a window open they become alarmed. Modern requirements of comfortable and luxurious appearance, and the use of plate-glass, which is an effectual excluder of draughts, with close-fitting doors, all tend to prevent the admission of fresh air, and instead of good wide open fireplaces we now nearly close up our chimneys with register stoves, and, as a consequence, we must resort to all sorts of contrivances to get ventilation. He believed there was a great deal of merit in many of the systems shewn, but was not prepared to say they would all act under all circumstances. He thought a careful consideration of their various principles would be necessary before adopting them. He believed the most simple and effectual means of ventilating an ordinary house for general purposes, was to have one of either Mr. M'Kinnell's or Mr. Watson's ventilators in the roof over the staircase, and so use the staircase as a ventilating shaft, which would secure a general circulation through the house, and answer for all ordinary purposes.

A vote of thanks having been passed to Mr. Marrable for having opened the discussion, and to the strangers who had attended, the meeting was adjourned.

OF CERTAIN ANALOGIES BETWEEN ARCHITECTURE AND THE OTHER FINE ARTS.

By the Rev. W. Whewell, D.D., F.R.S., Hon. Member, Master of Trinity College, Cambridge.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, March 9th, 1863.

I am well aware that I have no claim to be listened to in this assembly, as possessing any practical or technical acquaintance with that art and science, Architecture, of which so many of the members of the Institute are in practice and in theory masters. With regard to the historical and ideal aspect of the subject, the manner in which different styles of architecture grew out of and succeeded one another, and the peculiarities of each style in detail, I have in former years propounded some views, in which even professional architects have not disdained to take some interest; but this aspect, also, many students of architecture, both professional cultivators and mere lovers of the subject, have in recent years followed out with more of historical knowledge, and a wider survey of architectural example than I could adduce; and I do not think I could now contribute anything of this kind which has not been anticipated by recent writers. Still, the general views which have suggested and guided my speculations have been received with so much indulgence, that I am encouraged to present some of them once more to a meeting of the Institute. Perhaps, as the thoughts of a speculator, who looks at the subject from a point exterior to the professional circle, they may call up, even if it be only in the way of corrective, some ideas which, while they are more exact than the loose notions of the mere amateur, may be more comprehensive than the usual maxims of the professional architect.

We shall be led to such a field of speculation, if we take some of the widest questions which belong to our Art, as an Art. What *kind* of Art is Architecture? And in order to give more precision to this enquiry, let us recollect what arts there are—that is, of those which are usually called the *Fine Arts*—and how they have been described. These arts are Sculpture, Painting, Music. These have been called by speculators, from Aristotle downwards, *imitative* arts. And this at once suggests the question, Is Architecture an imitative art? Let us consider.

The imitative arts imitate some class of objects, and imitate them by means of certain materials, modified in a determinate manner. Sculpture imitates objects, say, for example, the human form, by shaping materials, say marble, into a like form. Painting imitates objects, it may be again the human form, by materials which give light, shade and colour. Music imitates the voice of human emotion and passion by tones taken from a definite scale of sounds, uttered with a definite rhythm. This may suffice as a starting point.

In order to proceed from this point, let us recollect in what manner these arts become most distinct. They are most distinct when each is most *pure*—pure, that is, from admixture of the others. When sculpture imitates by form alone, and not by form combined with colour, it is most pure. I do not say better or worse; but it is then most *pure*. So painting, to be pure, must be on a flat surface: not the painting of a sculptured relief. But painting may be divided still further. It is, as I have said, imitative by light, shade, or colour. But imitation by light and shade may be practised separately, as in a black and white drawing. The art of making such a picture—*skiagraphy*, if you please to call it so—is pure when colour is absolutely excluded. Music is pure music when it addresses itself to the ear only, without any aid from acting, costume, or scenery: some would say, even from words.

Hence the thought at once occurs that Architecture, as one of the Fine Arts, will be pure, when it is unmixed with the other arts; when, for instance, an architectural pile has no decoration in the way of sculpture or painting. This is pure architecture.

But have we any such architecture? We have many specimens approaching very near to this standard. At any rate we have no difficulty in reducing to this standard well known examples. We can, in imagination, strip from the exterior of the Parthenon the sculpture of the tympanum and the reliefs of the friezes; and the architectural features remain plain and distinctive. We can divest the interior of Salisbury Cathedral of the few portions of carved foliage which it contains, and the architecture is unchanged, and stands before us clear and plain. In these and similar cases, when we remove the contributions of the sister arts, as they are sometimes called, we have before us a residue of a special kind. This residue is the work of *our* art, Architecture.

Architecture, then, is an art distinct from sculpture and painting. Is it an imitative art? and if so, what does it imitate? These are questions which I wish in the first place to consider.

Is Architecture an imitative art? Perhaps some persons may be disposed to reply, No: Architecture is not an imitative, but a constructive art. Each architectural structure does not imitate some other structure, or some other thing. It is itself a structure; its parts are what they are, and are connected as they are, by the necessities of construction.

But is this so? Are the parts of a building—meaning, of course, a building complex and architecturally rich—determined by their use? At first it may seem so. The columns of a Grecian building support stone blocks, which form the entablature. The clustered pillars of a Gothic building, such as Salisbury, support the arch mouldings and the vaulting ribs, which support the vault.

This is the idea of a Gothic interior—confining ourselves at present to that case. The piers are divided into shafts; the pier-arches are distinguished into many mouldings, with hollows between. The idea is, a multiple pier supporting a multiple arch; and hence we have clustered piers supporting clustered arch mouldings.

Yes, we have these *in idea*, but not by a necessity of construction; for this construction ceases to exist really, almost as soon as the idea manifests itself. The clustered pillars which form the piers are, indeed, I allow, in several early examples, detached shafts; but this state of things, in the progress of the style, is soon superseded by shafts built in horizontal courses of stone. And the multiple mouldings of the pier-arches are never so many strips of stone in the building, except, perhaps, in a few rude examples. These clustered mouldings, like the clustered columns, are built of transverse courses of masonry, each course of the masonry taking in many parallel mouldings. And in the same way, the vaulting shafts which support the ribs of the vault in idea, are really in construction, very commonly at least, part of the masonry of the walls. And the vaulting ribs themselves are not ribs formed of stones detached from the vault which they support, but are generally formed of stones which supply also not only the rib but a part of the pannel surfaces of the vault.

And thus an architectural structure, such as the interior of Salisbury Cathedral, represents to the mind indeed a construction, in which collected pillars support collected pier-arches, and vaulting shafts support vaults; and, I may add, in which windows also have often arched head mouldings supported by shafts in the window sides; but though it *represents* such a structure, it *is* not such a structure. It is a work in which such a structure is represented, for the most part, by courses of masonry; although in some parts of the building the pillars which are detached shafts to the eye, may really be separate stones. The courses of masonry are for the most part horizontal, and, consequently, transverse to the pillars which they represent; but the courses of stone in the arches are also transverse to the mouldings, each stone including several of the mouldings, which to the eye are separate. And after the first steps of this kind of architecture are made, the clustered shafts of the pier, and the clustered mouldings of the pier-arch, assume forms which are more varied and more closely combined than detached members could be; and though still indicating the idea of a frame-work of pillars, arches and vaults, indicate this idea by cutting the leading lines of such a frame-work on the stones of a structure of masonry.

And thus we may say that, in this case, such an architectural work imitates in a structure of masonry the form of a constructive frame-work of stone. And in this sense, and in this manner, in such instances, Architecture is an imitative art. The object imitated is a frame-work supporting a ceiling. The means of imitation are cut stones joined in masonry.

And this definition of Architecture as an imitative art, applies to other cases as well as to this: to an exterior as well as to an interior: to Grecian as well as to Gothic architecture. This view is implied in the account which Vitruvius gives of the origin of the various members of the Grecian Doric Order: how that the architrave represents the beams which lie on the supporting pillars; the triglyphs the ends of the joists; the cornice the projecting border of the roof and its rafters. This is the object of imitation in the idea; and that the means of imitation is masonry we see in the divisions of the columns into courses. It is only in rare instances that the columns are really the single-stoned upright supports which they represent.

Thus the idea, not the reality, of a constructive frame-work governs the form of architecture; and how completely and pervadingly this idea determines the form we may see fully exemplified in a Gothic church. The idea of such a building, in one of its most general forms, is that of three parallel vaulted aisles, the centre aisle being the higher, so as to admit light through the clerestory windows. Now all this is stamped on the ground-plan of the building, and manifested in the very first course of stones. For the clustered pier contains shafts which support the pier arch, shafts which support the transverse ribs of the vaulting in the centre aisle, and shafts which support the diagonal ribs in the same aisle; shafts also which support the transverse and diagonal ribs of the side aisles. And thus, supposing all these shafts to spring from the ground, and the pier arch to have three of them, the plan of the pier would have twelve shafts; and if the vaulting were to be made more complex, might have more. It is true that the plan of the pier does not always contain so many of the imaginary shafts; for sometimes the vaulting shafts of the centre aisle begin from some higher points; for instance, the capitals of the piers; and different shafts coalesce, or are combined in various degrees of subordination. But the general notion of a vaulted frame-work, imitated in masonry, remains; and is alike seen in Salisbury Cathedral and King's College Chapel. And of course the imitation includes all that is necessary to stability in the construction imitated. But being a representative imitation, it needs not and does not subject itself, in its parts, to the rules which would govern the frame-work, if it were really a frame-work and not masonry. It is no defect in the vaulting shafts of King's College Chapel, for instance, that singly they are too slight to support the vault. Just as in another art, it is no defect in a statue that the marble legs of the figure are too slight to support the marble body. The legs are involved in masses of drapery, or put in contact with the stump of a tree, and so the figure is supported. And thus Architecture is an imitative art, governed and moulded by the conditions of its material, masonry, just as sculpture is an imitative art, governed and moulded by the conditions of *its* material, marble. And thus, as in sculpture we have the old adage, *ex pede Herculem*, in architecture we have a like principle, that the details of the building are involved in the ground plan; and if we had only the lowest course of a clustered pier before us, we could, in idea, restore the building; just as the anatomist can, from the bones of the foot, restore the whole of the animal. There is an organic connexion and unity in the one case as in the other.

I do not know whether this speculation will appear too fanciful to my hearers; at any rate I am not the first who has attempted to determine in what sense architecture is an imitative art: and that the answer to this question is not obvious may be judged from the strange answers which have been given. Thus Algarotti speaks of the absence of anything in nature on which architecture can be modelled; and says that, with good reason it may be said to hold the same place among the arts that metaphysics does among the sciences.

However fantastical and unreal the analogy thus asserted may be, the assertion shows how readily analogies are sought and found between architecture and other arts and sciences: and we have examples of the same tendency in speculations concerning architecture which have been published recently among ourselves. And this being the case, I may be allowed to dwell for a moment on the analogy which may, I think, be pointed out between Architecture and another of the Fine Arts which I have already mentioned, namely, Music. It may be said that any such analogy must be extremely fanciful; and, doubtless, fanciful it must be. But such play of fancy may still operate so as to be a source of some of the pleasure which architectural works bestow. Nor is it difficult to discern, in this case, some analogies which must be allowed to be real. Take, for instance, a musical strain; in order to be music at all, it must be rhythm; that is, it must be divided into bars, or equal intervals of time, marked by the recurrence of accent. Now, in like manner, a colonade, the front or the side of a great temple, for instance, must be divided into equal intervals of space by the columns. The equality of the intercolumniations is a condition of anything which can be called architecture, as the equality of rhythmical beats is a condition of anything which can be called music. No doubt, in architecture, this equality may be replaced by a symmetrical inequality; and so in music, the rhythm may have unequal intervals, provided these be symmetrically included in a wider regular rhythm. Here we have between architecture and music the analogy which exists between space and time; an analogy which lies so deep at the root of many of our perceptions, and which supplies some of the conditions of our perceptions of beauty. Is there, then, anything in the case of architecture which supplies the place of the melody which in music is added to the perception of rhythm? I will not say that there is, in order that I may not be accused of pushing my analogy too far. But at least we may say that an architectural front, with architectural elements, similar but varied, recurring at equal intervals, has a sort of analogy with a strain of melody.

But this applies to melody only. Is there anything in architecture which has any analogy with harmony? Harmony, for our purpose, may be regarded as implying the co-existence of two or more strains of melody, each of which, besides that relation of successive musical phrases which makes it to be melody, has also relations to the accompanying other melodies; relations producing concords and discords between the simultaneous notes? We have hitherto taken only exterior architecture; and one front of such architecture. But if we take a building of which two fronts are seen at once, each having its intercolumniations and its successions of ornament; the second front, seen at a different angle from the first, and modified by perspective, has relations to the first front of a new kind; and the mind, comprehending in one view these two series of rhythmical forms, is sensible of a peculiar beauty in such a combination. Every one must have remarked how superior in effect a view exhibiting two sides of an architectural edifice is to a mere elevation; as superior as harmony is to melody, and in something of the same way. Musicians are wont to find a peculiar beauty when, in two strains which combine to make harmony, one ascends at the same time that the other descends, the laws of harmonic combination and succession being still observed. In somewhat a like manner, when two sides of a rectangular building are seen, the two having elements to a certain extent corresponding, and these elements, by the effect of perspective, advancing on one side from small to great, and on the other receding from great to small, we have a kind of architectural harmony which many persons will feel to have a peculiar beauty.

But I think we may discover a kind of architectural combination in which we have something still more nearly resembling harmony in music. Harmony is included in several simultaneous strains of melody which run parallel to each other, rather than in strains related to each other like two fronts making an angle. Now where have we examples of rhythmical architectural structures running parallel to each other, with the same rhythm, that is with corresponding intervals in their length, and having also mutual relations of their parts? Obviously we have this in interior architecture, and especially in such interior architecture as is determined by the conditions of connected roofing.

In the interior of a gothic church, with its three aisles for instance, we have four parallel rhythmical structures, namely, the two rows of piers with their vaulting shafts and the vaulting ribs which spring from them, and the two exterior side walls with their vaulting shafts, windows and buttresses. Each of these parts is in itself, taken according to its length, a rhythmical structure; and moreover each has, at every step of the rhythm, its transverse relations to the others. The eye readily grasps these regular relations, both longitudinal and transverse; and in the perception of these regular relations and of their mutual play, there is a source of admiration like that which we give to harmony in music. It is not too fanciful to say that the aisles of a cathedral may be compared to the parts of a psalm-tune—the treble, alto, tenor and bass. The concord or discord of those parts in the tune, as the bars succeed each other, are a sort of *transverse* relation between *parallel* strains of melody—much as the agreements and disagreements of the piers, shafts, vaulting spaces, triforium arches and windows are a transverse relation in the building. And it must be added that, though in the geometrical design of a building these transverse relations are all along the same, or nearly the same, they are, in the actual presentation of the structure to the eye, so modified by the effect of perspective, varying at every step, that there is abundant place for the successive concords and discords. The coincidences and displacements of corresponding parts are apprehended by the eye, as the concords, and preparations and resolutions of discords are by the ear.

I do not know whether this comparison of exterior architecture to melody, and of interior architecture to harmony, will seem to my hearers too fanciful to be tolerated. To me it seems to be something very real; and I think I may venture to say, that if any lover of architecture will, in looking at edifices, give up his mind to it, he will find that it may serve to bind together many floating thoughts that, however vague and fugitive, are not without their value as elements of the enjoyment of art. This view applies more especially to Gothic architecture, in which the conditions of vaulting make the transverse relations more marked and organic; but it has its influence in regular architecture of every kind.

The views which I have tried to explain suggest some remarks bearing upon opinions which have been recently promulgated. In the first place, since Architecture contains in itself elements of beauty which have analogies to the elements of beauty belonging to an art so complete and complex as Music is, Architecture must be considered as a distinct and independent art, involving its own ideas of artistic beauty. Architectural works are not mere frameworks for sculpture or painting. They are constructive frameworks imitated in masonry for the sake of the pleasure which Imitative Art gives. They are most complete when without sculpture or painting at all; or at least they are, when so insulated, equally complete and most pure. The elements of architectural work—pillars with bases and capitals, mouldings, window-tracery, and the like—are, or at least may be, mere architectural forms, not needing to imitate foliage or any other thing. We can easily conceive a cathedral—Salisbury for instance, or Lincoln—reduced to this condition, and its relations as an architectural work would not be thereby impaired, though it might perhaps be criticised as being too plain. In the interior of St. Eustache at Paris we have a fine example of a Gothic structure without Gothic details of ornament.

But doubtless foliage in the capitals of columns is very general, and can hardly be regarded as a violation of purity. This element of architecture may be conceived as proceeding from a principle which is naturally suggested by the notion of a framework supporting a vault—the principle of upward tendency, which assumes at last the form of vegetable development. The vaulted aisles of a gothic church have often been assimilated to the natural arcades of a grove. There is at least some resemblance in the way in which the trees separate into branches and the pillars into vaulting ribs; and the notion of vegetable development thus superinduced upon the notion of masonry gives rise to the imitations of foliage which appear in various parts of an enriched building—imitations not servile or naturalistic, of course, but reduced to symmetry and regularity, as imitations of nature always are reduced in the imitative arts.

Hence, too, results another rule of architectural art, which used to be generally accepted, but which has of late been questioned or denied; namely, this rule:—that the upper portions of an edifice must be more divided into parts or more adorned with sculptured foliage than the lower parts. We know that this is the case commonly, as in vaulting, in the tracery of windows, in the distribution of windows, and the like. The principle of vegetable growth ramifies and branches out more and more in ascending. Hence, too, pinnacles seem quite incomplete without their due adornment of crockets and finials; and hence, in gothic work at least, statues cannot take the place of pinnacles. The cathedral at Milan, with its thousand pinnacle-statues, is in this respect quite unarchitectural. In Greek and Roman work the feeling is different, and statues may be placed on the top of a building—a proof, as seems to me, of the reality of the principle which I am pointing out in gothic work. In that kind of work, statues may be placed as high as you please, but it must be in a niche or under a canopy, like the statues at the top of the buttresses in the cathedral at Rheims.

There is another remark suggested by the view which I have taken—a remark which may perhaps tend to correct a fallacious doctrine which suggests itself in the course of our architectural speculations. In the course of these speculations we learn to see that the constructive and the decorative forms of architecture may be different. In the Greek architecture at first they agreed. Both in the structure and in the decoration, vertical pillars supported a horizontal entablature. The Romans made the arch the real principle of the construction, but retained the Greek orders—columns and entablatures—as the principal feature of decoration. In the course of time the columns were made to support the arches, the entablature disappeared, and the Romanesque style was formed. Here it again came to pass that the constructive and the decorative system were not discrepant. But the conditions of cross-vaulting came in, and the arches became pointed arches: their skeletons were marked by mouldings; the pillars were clustered in virtue of the vertical tendency of the structure, and the gothic styles were formed. And looking at this succession of forms, we are sometimes tempted to say that those are genuine kinds of architecture in which the real structure and the decorative form coincide. But if we understand this coincidence literally, the maxim does not bear examination. The real structure may be *represented* by the decoration, but it is not identical with it. As soon as the structure is conceived, it is not really constructed, but only represented by the masonry. Even in the Greek architecture, the columns are rarely single stones. In the Roman architecture the arch and its impost is, as to the eye, inserted between the columns, but really made part of the same mass of masonry with them. In Romanesque the vaulting shafts are not really detached from the wall. In cross-vaulting, the skeleton of the vault is not really detached from the vault, at least in general. In each successive style, as soon as the principle of construction is clearly conceived, it is imitated in masonry; and thus it is that Architecture is an Imitative Art. The same notion may be followed further: as when in the after-gothic styles the whole wall becomes a structure of pannels. In tracery, it is obvious how different the forms of the mullions, as the eye follows them, are from the pieces of stone by putting together which the mason constructs them.

This last example—tracery—shows very distinctly how untenable is the doctrine that in the most complete and consistent kinds of architecture the constructive agrees with the decorative structure, and that the architecture becomes false and degraded as these diverge. For in the earlier kinds of tracery —the geometrical tracery of Amiens or Cologne, for example—we have a decorative structure which never was, or could be, the real structure. The tracery bars represent flexible stems; these bars never could exist in stone as bars. They are rightly assimilated to boughs of trees in the theory of Sir James Hall and the poetry of Sir Walter Scott. The poet's description of the window at Melrose expresses the view which the mind spontaneously takes of the work:—

> " The moon on the east oriel shone
> Through slender shafts of shapely stone,
> By foliage-tracery combined;
> Thou wouldst have thought some fairy's hand
> Twixt poplars straight the osier wand
> In many a freakish knot had twined,
> Then framed a spell, when the work was done,
> And changed the willow-wreaths to stone."

The thought of a spell by which one thing is changed into another belongs to all Imitative Art, and is very fitly called the magic of art.

In this same matter of tracery, we see that decoration and actual construction not only do not necessarily diverge in the progress of time, but may converge. *Geometrical* and flowing tracery, the earlier forms of tracery, are utterly unconstructive. Stones *could not* follow their lines. But when we come at a later period to *perpendicular* tracery, we have the window really made up, almost or altogether, of lines of possible constructive forms.

The President, Mr. Tite, M.P., thought he should best perform his function as Chairman by asking for the reflections of those around him rather than by giving his own upon the very philosophical, able and learned paper which had been read by Dr. Whewell. The Essay was so suggestive that without a little time for reflection upon it (as far as he was concerned) he should hesitate to give any opinion upon the theories which had been brought before them. The highly poetical character of the subject rendered it exceedingly difficult to speak upon it without some previous thought, particularly viewing it in connection with the practical science with which it was their province to deal. He thought they were exceedingly indebted to their learned friend for the very elegant character of his communication. It was quite clear that it contained the germs of deep thought which would form matter for quiet reflection; but at the same time, the whole matter was so suggestive that he would nevertheless invite the opinions of those who had heard the paper, rather than at the present moment offer any further remarks of his own. No doubt they had all been taught from their earliest days that architecture was an imitative art; it was the doctrine of Vitruvius. But how far that theory could be applied to Gothic architecture he would scarcely venture upon an opinion in the presence of gentlemen who had paid more attention to that subject than he had done. He would, however, now ask those learned gentlemen to favor them with remarks on the subject. No doubt the singular Essay of Sir James Hall, which Dr. Whewell had referred to, and the types of Gothic architecture he had proposed, whether true or not, were very fanciful and very poetical. Although they had a small meeting this evening, which was no doubt due to the peculiar incident of the time—which he hoped the learned professor would accept as the apology—he nevertheless saw around him some of the most eminent professors of architecture of the day, and he now begged to invite their remarks upon the communication with which Dr. Whewell had been kind enough to favour them.

Mr. G. G. Scott, V.P., quite agreed with the President as to the extreme difficulty of shaping any ideas upon the theory which had been laid before them in so interesting a manner this evening. They were most of them practical men and artists rather than philosophers; whereas Dr. Whewell united the study of their art with a perfect knowledge of philosophy; and therefore he thought it would be almost out of taste to attempt, on the spur of the moment, to criticise what so learned and able a man had laid before them after long study of the subject. That which had been brought before them was most interesting, but it was more a matter to think upon quietly at their leisure than to hazard an opinion upon at the moment. It was full of matter for thought; and he felt that for him to venture to make even the smallest suggestion would be almost impertinent; but as a matter for thought, he felt that the ideas brought before them were most valuable and important.

Mr. Digby Wyatt hesitated for some moments in the hope, as he said, that his elder brother, then present, a far worthier, and an older member of the Institute than he was, might have risen in response to the invitation of the President. Despite what his friend, Mr. Scott, had said as to the audacity involved in hazarding any remarks upon this subject, after what Dr. Whewell had been good enough to bring under the notice of this meeting, he (Mr. Wyatt) would venture to say a few words. The plea of the novelty of the theme could scarcely be admitted as an excuse for silence, since, to every true lover of Art, such a subject as the relations to one another, of her varied branches, springing from one common stock, must of necessity have presented itself to the mind's eye at a very early stage of any inquiry into the principles upon which excellence in any special department must be based. *Ab initio*, the student would almost intuitively enter upon, approximations to correct analysis, and the resolution of Art, taken as a whole, into the various elements of which it might appear to be composed. Such an analysis to be useful must be both "quantitative" and "qualitative," and must include not only the relations of the constituents to the whole, but of the constituents to one another. Fortunately several distinguished writers had, like Dr. Whewell, lent the great powers of mind they possessed to the elucidation both of the ties, and of the differences, which exist between the multitudinous ramifications of the vast commonwealth of Art. He might, indeed, congratulate the Institute upon having within its ranks, and indeed within its walls that evening, a gentleman who had done more probably than any other man living to illustrate those analogies—he alluded to Mr. Fergusson. Previous to the publication of that writer's "Inquiry into the true principles of Beauty and Art," he (Mr. Wyatt) had made the acquaintance only of writers such as Lessing, Winckelman, Alison, Dugald Stewart, Eastlake, and De Quincy, who had touched with more or less acuteness on this difficult subject of the relation of the arts to one another; but upon a perusal of Mr. Fergusson's work the scales had as it were dropped from his eyes, and his doubts and difficulties had been to a great extent dispelled by the extremely lucid though necessarily complicated analysis made by that gentleman. As his modesty might not perhaps allow Mr. Fergusson to put forward the ingenious and original views which his lucubrations had led him to, he (Mr. Wyatt) would venture to point out the great lines of demarcation laid down in the work to which he had alluded. Mr. Fergusson had distinguished the functions of the sister arts, sculpture and painting more particularly, by what he had called their phonetic element;—implying thereby that it was their special privilege, mainly through their directly imitative character, to give as it were voice and specific meaning to other arts, less imitative and therefore more abstract, when in union with them. On the other hand he regarded those arts which were usually called the *industrial arts* as the technical basis of *architecture*. Those Arts, born of the primæval wants of man, and growing with his growth, had grouped themselves together about his habitations and temples, and thus united themselves with architecture from the dawn of history to the present time. Gradually, with the march of civilisation, painting and sculpture gave grace and significance to his dwelling, as his imagination found vocal utterance in poetry and music. The most perfect embodiment of architecture was to be recognised when the union of the technic with the phonetic elements was most intimate. It was, indeed, a beautiful illustration of the analogy which assuredly exists between profound philosophy and the loftiest poetry, to find that in the master mind of Dr. Whewell, subtle analysis and abstruse contemplation of scientific and metaphysical phenomena should be inseparable from such an indulgence in elevated speculation as soared instinctively, from matter, into the higher regions of that speculative philosophy which constituted one of the leading characteristics of poetical sublimity. Such analogies, inherent in what Byron calls "the harmony of things," formed the happy elements which linked the mind of man to something far beyond himself, and all this world could give him. It must, however, be recollected that although, for the sake of distinctness in perception and study, it might be profitable to subdivide Art into many branches, still the analogies and relations which pervaded all were of so intimate a nature, that no work of Art could be really perfect in which the principles peculiar to each branch were not to a certain extent developed and combined. Those principles of order and symmetry, which Dr. Whewell had alluded to as coincident with the relations of harmony and melody, were the fundamental principles of regular design which made all things beautiful; in fact, they might be regarded as distinguishing such works as might have been produced by chance from those evoked out of the exhaustless treasury of Nature by Divine will. It was in the manifestation of a power to subordinate accident to symmetry that the creative power of man, whether in architecture or in any other of the arts of design, could be best vindicated and was most to be admired. It should also be remembered that, while all these arts, when blended, contributed to sustain and heighten the glories of each other, each had its own peculiar set of governing conditions, which experiment and study had gradually eliminated and defined, and which were ordinarily called the "conventions" peculiar to each. Thus painting and sculpture had each its own modes and limits of imitation; and if imitation should be attempted in sculpture as in painting, or in architecture as in sculpture, in each case failure would ensue. The special conventional conditions proper to each of those arts must be maintained, if a successful work of Art was to result. When technical excellence of workmanship, order, symmetry, and proportion of parts, strength and flowing grace of line, variety of surface with harmonious colour, and faultless imitation of all that is most beautiful in reality or in idea could be infused into one master-piece, the noblest monument of Art in human power to create might certainly be anticipated. These who studied the exquisite analogies binding the Sister Arts in happy union most devotedly, would do so most profitably, by holding on to a definite scheme of union, rather than to a fruitless effort to separate what had been made, by higher Power, one and indivisible.

Mr. Fergusson, Fellow, had but little to add to what had been so ably said by his friend who had preceded him. He took a view somewhat different to that taken by Dr. Whewell, inasmuch as he thought that every art sufficed to itself. He thought architecture especially was an art which in itself had all the elements of beauty when these were properly elaborated, and had no need to borrow even suggestions from any of the sister arts. In like manner he conceived that all the other arts referred to, such as painting, sculpture, music, could suffice for themselves without trenching on the domain of the other arts. But they had this analogy, that they all worked from use to beauty by one and the same process. It was one of the highest privileges of the human intellect, as compared with those of the lower animals, that man, and he alone, could convert all those useful arts—which in the first instance were necessary for his existence—into fine arts, which were the sources of the highest intellectual gratification. This elaboration being, in fact, the basis of that refinement that distinguished the civilized from the savage man. So far, he could see a clear analogy between painting, sculpture, and music, and architecture. They all were based in use and elaborated into beauty with the same aim, and by the same intellectual process; but beyond that he failed to perceive any tangible analogies between arts springing from such different bases, and applied to such different purposes. Least of all could he perceive the applicability of the term "imitative" to the art of architecture. So far as he understood the subject, architecture seemed to be the most essentially creative of all the arts—neither copying from any other art, or indeed even from the works of nature, scarcely even condescending to borrow a suggestion or to look for an analogy in any other. In all true styles it appeared that every form was adopted from constructive exigencies, and every ornament invented to express clearly and gracefully those forms or others analogous to them, but both form and ornament were always such as were suggested within the strict limits of the art itself. Under such circumstances, it did not appear to him that the term "imitative," in the sense in which the word is usually understood, could with propriety be applied to this art. On the contrary, he looked on architecture as one of the most essentially creative, as it was certainly one of the noblest of human arts.

Professor DONALDSON, Fellow, would say with their Hon. President that the subject introduced to their notice was one, on which it was so difficult to collect their thoughts, that there was little hope of adding anything fresh to what they had already heard. After the elaborate paper of Dr. Whewell, they might almost feel themselves to be in the position of the pupils of Plato, whom, as they heard the eloquent outpourings of the master in the Groves of Academus, they would hardly presume to ask to enlarge upon a topic already well elaborated, or to ask questions in further illustration. So he (Mr. Donaldson) felt it would be presumptuous in him, if he ventured to enlarge upon this subject; but the President having been pleased to call upon him, it would be discourteous to the reverend gentleman, who had read the paper, if he declined the invitation to say a very few words. It seemed to him desirable that they should have defined to them what was Art? There was a great line between art and fine art; and he understood the arts of design to be those, which properly should be attributed to painting, sculpture, and architecture, and that music was not an art of design, but was ruled by different laws, as a different means of expression and therefore quite distinct. The gentleman who preceded him (Mr. Fergusson) had been pleased, in a late paper, to compare architecture to cookery, as being one of the *arts* of the time. Now, as an architect, he had felt himself rather humbled by the comparison, because, although cookery certainly addressed itself to the taste, it was a different taste to that of architecture: the one was animal, the other intellectual. Therefore he should like to limit architecture as being one of the arts of design. Dr. Whewell had alluded to the analogy in regard to music, to which Vitruvius had called attention, and it was remarkable that the music of the ancients was of a more complex nature than our own; each note was more subdivided; their time and harmony were different to our own; and certain laws seemed to prevail in the Greek mind, with respect to architecture, as minute and complex as those of their music. Of this class were the remarkable discoveries made by Mr. Penrose in the lines and proportions of the Parthenon, and these laws, he himself believed, regulated all their designs, but were quite beyond comprehension in the present day. Architecture appealed to the eye in the same way as music appealed to the ear. The one had its harmony and the other its *rhythm*. With respect to seeing the two sides of a building harmonious, or inharmonious, there was a remarkable illustration of this in the Erectheum in the Acropolis of Athens. On the two sides of that building there were two porticos — one the hexastyle, and the other the tetrastyle; both of the Ionic Order. Now, although these were at different levels, and though one rose to a greater height than the other, yet there was harmony between them, and the eye was not shocked by the *difference of level* and the contrast which (&c.) arose from their different proportions. But directly they got to the other side of the building, there was the portico of the Caryatides, so in contrast in every respect with the rest of the building, that the mind received a shock, and the harmony which appeared on the one side was lost upon the other. This must have been particularly evident in the structure of Old St. Paul's Cathedral, when Inigo Jones introduced the Corinthian portico on the western side: it destroyed the harmony which existed in the rest of the cathedral, which was of the Gothic character. Dr. Whewell had said that architecture assumed to be independent of the other arts. He (Mr. Donaldson) avowed his feeling to be that architecture never could *properly* exist unless combined with the other arts. A building, as a building, was a mere work of constructive science, but it did not properly rise to the dignity of fine art unless it was combined with sculpture and, as he thought, with painting; for after all, however harmonious and beautiful the building was in its proportions and all its architectural parts, what would it be without the sculpture upon the face of it to complete the sentiment and give it expression. For instance, in the Parthenon, how essential were the sculptures to its glorious perfection; and in Wells Cathedral, they must allow, the architectural features would sink into nothing, if it were not for the beautiful sculpture, which formed the greatest decoration of the cathedral. Therefore it appeared that sculpture was a necessary part of architecture; and he believed also mere sculpture itself, placed by itself, was not sufficient to create all those fine emotions in those who saw it, unless it were in combination with the other arts to produce its full effect to perfection. Therefore it seemed to him that they ought not to attempt to be independent of such accessories. It was in the harmony of the whole that they created the greatest emotion; and they fell to the grade of mere constructors of buildings, if they limited their conceptions to architecture alone without the combination with the other sister arts. In fact, in his opinion, sculpture was too much ignored, and their finest buildings were criticised as devoid of life and meaning, because they had not sculpture. He had on previous occasions quoted the British Museum as a building cold without its sculpture; but if that were added to it, it would raise it to a great degree of beauty, and would lose that coldness which attached to it, fine and noble as it was. St. Paul's had not the sculpture with which Sir Christopher Wren intended it to have been enriched. In Gothic buildings, as in Salisbury Cathedral for instance, they had a superiority over classical buildings by the energy, piety and liberality of their forefathers in furnishing sculpture as necessary to the beauty of the whole; and this it was which rendered their gothic structures so noble. Whereas our buildings since the 15th century were in that respect almost beneath criticism. In conclusion he remarked, that the paper itself was so instructive, so deep and so profound, that he could not collect all the thoughts which arose as he heard it delivered, and therefore could not at the present moment offer any further observations upon its many topics; but he anticipated the greatest pleasure from reading it in print and more maturely considering its many valuable suggestions and observations.

Mr. Fergusson wished to explain. His friend who had just spoken had entirely mistaken his meaning, when he said that he (Mr. Fergusson) had compared Architecture to Cookery. What he said was, that all the arts could elaborate from use to beauty by one and the same process. In the pamphlet to which allusion had been made by his friend, Mr. Digby Wyatt, what he had stated was, that all the useful arts could be elaborated into beauty by one general process. By that process prose could be elevated into poetry, hieroglyphics into historical painting, carving into sculpture, gardening into floriculture, and agriculture into landscape gardening; and by the same process that mere utilitarian building might be elaborated into the fine art architecture. But he had never meant to say that all these arts were consequently equal; still less, that poetry and architecture stood on the same level with gastronomy or tailoring. The oak ought not to be offended if it is told that it belongs to the same kingdom as the thorn or the briar, and even if it is pointed out to it that it grows by extending its roots through the soil, and spreading its leaves to catch the rays of the sun, and to extract nourishment from the atmosphere. There are vast differences between the relative beauty and importance of the various objects of the vegetable kingdom—between the cedar of Lebanon and the hyssop that grows on the wall—but what he said, or intended to say, was this, that if any person wished to understand how an oak tree grew, he would do better by studying the physiology of other plants, and by confining his researches to the vegetable kingdom, than by seeking analogies among animals or minerals. So far as experience goes, these remote analogies have hitherto misled every one who has attempted them; whereas the discovery of truth has always rewarded those who have only investigated true analogies among closely allied objects, and this as true in art as in natural science.

Mr. Arthur Ashpitel, V.P., said often as he had risen in this room he never did so with greater diffidence than on the present occasion to offer any remarks upon the subject before them; and he should not have obtruded himself now, but that as knowing something practically and theoretically of music as well as of architecture, he felt it his duty to say a very few words. The idea which had been brought before them this evening that there was an analogy between music and architecture was not wholly new. They had read of a celebrated person, Madame de Stael, who had defined architecture as "frozen music," and he had no doubt something of the kind must have occurred to other minds; but this was the first time he had heard these analogies reduced to anything like a system, and therefore it was with unfeigned pleasure he had listened to the paper this evening. There were also a few analogies between architecture and the other fine arts, which he would venture to mention; and one of them was this,—that of course it was absolutely necessary to any success in architecture that the construction should be the first thing to look to. So it was in music. The grand basses upon which all our great anthems were built must be perfect, or the musical composition was bad. Just as we put decoration upon the construction, so the musician superadded melody upon harmony. The same series of chords might suit many melodies: so the introduction of various decorations might suit the superstructure of the architect: but if the constructive lines were bad—as if the constructive grounds of harmony were violated—so must the superstructure be bad. But there was something more. We have not only superadded sculpture to our art, but have also availed ourselves of the use of colour, and a number of other adjuncts. So it was with the musician. He was not content with simple harmony produced by one description of instruments, but he would introduce wind instruments with the string band. Their various sounds perhaps expressed the same note, but in *different qualities* of tone, as the flutes differed from the clarionets, and these again from the horns, technically called by musicians "musical colouring." Here was the same analogy. If architects had not a good sound symmetrical construction on which to put colour or add sculpture, the whole thing is a failure, as in some opera music of the present day, the composer imagined by the clamour of trombone and trumpet—or as Pope expresses it, "gun, drum, trumpet, blunderbuss, and thunder," to make up for the incongruities of his harmonies, or the poverty of his ideas. The analogy might be carried still further. He was satisfied there was something like a law of nature that beauty of one kind at least depended upon symmetry of parts and harmony of proportions. No doubt in classical architecture, the proportion of supports to voids, or of the parts to be supported to those which are designed to bear their weight, was a great cause of the pleasure we derive from their contemplation. We get at the same time ideas of utility, symmetry, and of beauty. No doubt in Gothic architecture the feeling that the piers were so proportioned as amply to support the arches and the vast and ponderous roof, added considerably to the pleasure they had in contemplating such structures. While the mind is gratified by the feeling there is ample security and ample strength in a construction, it is also pleased to observe the skill that can do this without wasteful expenditure of material. There was also no doubt a great deal of analogy between the learning of the two arts, the laws of the progression of harmonies and of fundamental basses, and those of the orderly proportions, or as it has been called, the *rhythm* of architecture, and that both arts had been reduced to system by rules which had come down from the earliest times. It was supposed, with the greatest probability, that the Gregorian *tones* were directly derived from the old Greek Canons, the proportions of which had been worked out mathematically, and all the intervals laid down with the greatest care and skill, and yet with an allowance for fancy, for novelty and boldness of effect. There were certain rules from which if they departed they wandered into eccentricity, became odd and uncertain instead of original, and they failed to give pleasure even to the uneducated mind. It is however equally true there might be a pedantry of architecture as well as of music. In the time of the great John Sebastian Bach, when every one was writing fugues, what a number of pedantic things were composed and an immense deal of energy and ingenuity were expended in producing cold correct crudities which were productive of no pleasure to the ear. In like manner, some time ago, in architecture there was a pedantry which was almost intolerable; a certain relation of parts was forced upon everybody. Happily they had escaped very much from that; the only danger now was—to raise another analogy—that they might rush into an opposite evil, and get into too great confusion in endeavouring to escape from monotony. Here was a difficulty which none but a great mind could deal with. The fault of the present day was perhaps that of too much irregularity: they had laboured to be irregular. Some had even resorted to artifices for this purpose, which to his mind were as painful, or perhaps more so than the shams resorted to some time ago to be regular: when if there was a useful door or window in a room, a false door or window was designed to match it. If symmetry could stiffen into pedantry, irregularity could degenerate into oddity, nay, and often into ugliness. There were cases in which persons had gone out of the way to make things irregular, and there was danger in running into that extreme. This was very much the case with some modern musicians. In endeavouring to imitate the grand originality of Beethoven they had got into confusion of effect. If that gifted composer had departed from the trammels of established models, still there was always one great consistent whole in what he wrote, but in his later imitators there is so little which is intelligible; here and there snatches of beauty in a composition, but the general effect is confused and unsatisfactory, there is no great comprehensive plan. To take the analogy of another art, that of poetry, we should all remember the advice of Horace in every composition: "Denique sit quidvis simplex dumtaxat et unum;" a golden motto, which should be impressed upon the minds of poets, architects, and musicians. He felt he had expressed his ideas very incoherently; he felt also the difficulty of offering any remarks upon the excessively able paper they had been favoured with, and he hoped before the evening concluded the learned Professor would wind up the discussion by a few more remarks; and he was sure they would all go away better artists and wiser men for what they had heard.

Dr. Whewell said it seemed to him a matter of difficulty to find words better than those which had been used. He had found it difficult to give any definite phrases which would be likely to convey to the minds of the members present the thoughts which seemed to him nevertheless to have a certain reality; and having done the best he could to find words to convey those thoughts while quietly working upon the subject in his study, he felt he should succeed more imperfectly if he attempted extempore to give any further expression of his opinions. He had nothing to add to what he had stated in the paper, except to say that having dwelt much upon those thoughts he felt that they had reality in them; and if any gentleman could suggest a better way of expressing them, no one would be more glad than himself to see it done.

Mr. Morris, Fellow, called the attention of the members to a work published a century ago,* showing, he said, that for a long period the relation and analogy between architecture and music had existed in the minds of writers. The work was by Robert Morris, of Twickenham, in which it was proposed to produce a system of harmonious proportions founded upon the analogies of the two sciences.

Rev. Richard Burgess, B.D., Honorary Member, expressed his regret that he had arrived too late to hear the principal part of Dr. Whewell's able paper, knowing as he did that whatever fell from that distinguished gentleman was always deserving of attention. He had listened to the remarks that had been made upon this subject, and had greatly enjoyed the conversazione; and there was one remark of Mr. Ashpitel's which struck him. That gentleman had spoken of the evil of running into extremes—from a pedantic regularity to a confused irregularity—that is, if they had one thing they must have another like it for the sake of maintaining symmetry. He remembered an extraordinary illustration of the rage which existed for pushing what Mr. Ashpitel has called the pedantic a little too far. One of the Earls of Selkirk of the last century had a very ingenious gardener, who was all for symmetrical proportion. At the entrance of the grounds there were two summer houses or lodges. Of course as there was one there must be another. On one occasion a boy was detected stealing fruit in the garden, and being caught, was placed in one of these summer houses. When the Earl came into the garden he enquired what the boy had been guilty of, and was informed of the delinquency; but on going to the other summer house he found the gardener's own son confined there. "Surely," said the Earl, "your boy has not been stealing my fruit?" "No, my lord," replied the gardener, "but I put him there for the sake of symmetry." One word more about imitation. They would remember the inimitable Forsyth, speaking of the degenerate architecture of Rome, the city which contains the Parthenon, accounts for it by artists daily borrowing the details of that edifice, but never adopting the simplicity of its design. The artist cannot safely depart from these models; he therefore steals, and then disfigures them; he tries to efface the mark of the original master, and puts something of his own to conceal the theft; is this what is meant by architecture being an imitative art? Forsyth's remark upon this is:—"Man, though the child of imitation, imitates with reluctance." Now he (Mr. Burgess) wanted to go away with a clear notion of what imitation meant in architecture. When Dr. Whewell said it was an "imitative art," he (Mr. B.) did not suppose the Professor meant that architects imitated one another; though, at the same time, in studying the modern buildings in Italy, it was wonderful how frequently one might detect efforts made to conceal the imitations of ancient architecture. A man got hold of a beautiful model, and to make it appear that he had produced an original thing, he covered it with something which made it tawdry, out of proportion, and ugly. The architects of this country did not do this! He wanted to know if "imitative" meant imitating things in nature. Was it the case that it passed from use to beauty by imitating something in nature? He wanted to know the true value of that expression, "imitative art." All they knew was, that in architecture there was a great deal of imitation of the best models; and if the term "imitative" could be explained he should go away more comfortable.

The President said he would not imitate his friend who had just sat down by inviting discussion upon the term "imitation." No doubt Vitruvius taught that the early Greek architecture was a distinct imitation of the buildings constructed of wood in the earlier period of that people; and on the other hand, it was argued that it was not so, but that the Greeks had imitated early Egyptian models; but he was quite sure the opening of that *vexata quæstio* would lead to no satisfactory conclusion. He now rose for the purpose of making, on behalf of the Institute, the request that Dr. Whewell would allow them to print his very valuable paper. It would then be in the hands of all of them, and they would be able to reflect upon the valuable suggestions it presented. He trusted Dr. Whewell would grant that permission. With regard to the pedantry of symmetry which had been referred to, Pope had hit that idea when he wrote:—

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* Lectures on Architecture; consisting of Rules founded upon Harmonick and Arithmetical Proportions in Building. By Robert Morris. 8vo. Lond. MDCCXXXIV.—"I say buildings are to be performed by stated rules, as the several parts of musick in concert are." p. 47.

> "Grove nods to grove, each alley has a brother,
> And half the garden but reflects the other."

The poet laughed at that pedantry in his day. With regard to the convenience of an irregular house, he thought it desirable to avoid the necessity of having a large boudoir, *because there was a large apartment contiguous*, to which it was required as a balance. Lord Bacon, in his "Essays," had said that houses were built to live in, and not to look upon; therefore, let use be consulted before uniformity, unless both can be had. After all, he would say as the Greek Physician had said, that as "Life is short and art is long," he supposed they must be content to take things in that particular pretty much as they found them; for it was quite true, as one of our friends had stated, that architects imitated each other; they also imitated the ancients, and he did not perceive that they were very wrong in what they did in that respect. They were very much indebted to his learned friend for quitting his *otium cum dignitate* in order to direct their thoughts to the subject which had engaged their interest and attention this evening, and he was quite sure he expressed the feeling of the members in proposing a cordial vote of thanks to Dr. Whewell for his paper.

The vote of thanks was passed by acclamation.

ON THE ABBEYS OF IRELAND.

By the Rev. JOHN LOUIS PETIT, M.A., F.S.A., Hon. Member.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, March 23, 1863.

I BELIEVE the remains of Irish architecture have been studied more by the antiquary than the architect. We all know how much interest has been excited by the round towers which are found in every part of the island, and about which we are now, I suppose, as much in the dark as ever. But, the numerous ecclesiastical remains, many of them extremely perfect, though not of such high antiquity, nor so productive of discussion, are yet worthy of more attention than has probably been bestowed upon them. My object at present is not to dwell long upon each particular specimen I have visited, but merely to offer a few cursory remarks, and to point out the localities of the objects, so that they may be visited with the least trouble by any one wishing to make himself acquainted with them. For many of them will be missed by the tourist, unless he knows exactly where to look for them, and he will fall in with but a small number on the ordinary and frequented routes.

Before I started, I consulted "Grose's Antiquities of Ireland," or rather, I should say, the two supplemental volumes to his antiquities, for he did not live to complete that part of the work himself. These volumes are copiously illustrated, and the engravings generally convey a pretty correct idea. I may here remark, that though the views were taken before the beginning of the present century, they seem to represent, with fewer exceptions than might be supposed, the state of the buildings as they appear at the present day. In fact, though I cannot say I met with no disappointments, they certainly were not at all numerous.

I arranged my route in such a manner as to take in as many of the examples which particularly struck me in this book, as I conveniently could, and though I have left a great part of the country for (I hope) a future visit, indeed, the whole of the province of Ulster, and much of the south-western district, still, I think I have seen enough to enable me to form a fair opinion of the Irish monastic and ecclesiastical architecture belonging to the mediæval period.

For it is evident that a very great similarity, I may almost say uniformity, of character pervades the whole. Certain peculiarities are met with again and again; the same type is reproduced at considerable distances, and is not very much changed by the different phases of style. You will observe among my sketches views of different buildings, which might easily be taken for different views of the same—the outlines of some are almost identical—and on looking through the volumes to which I have referred, I find that the examples which I have not visited very much resemble those I have, so that a small collection may fairly represent all. This resemblance, however, does not destroy the charm which results from variety, for there will always be something, either in its position, or in its adjuncts, or in its state of preservation, or in some of its details, that will give each building its own distinctive and individual character, and make every fresh example we add to our collection a pleasing and valuable acquisition.

The architect, however, will not go to Ireland to collect specimens of detail, for the churches have little or no richness of ornament. What detail does exist is generally in good preservation, as much of it is of a very hard and durable stone—frequently a kind of dark marble—so that the mullions and tracery of windows will often be found very perfect, even in the most ruinous buildings. Unfortunately this tracery, generally speaking, is of but little value; there is one prevailing pattern of intersecting mullions which is often worked without foliations, and has a somewhat meagre look. There are, however, occasionally to be found marks of a better style. The parapet finished with a battlement tapering in steps is a universal feature on towers, and is, also, freely used in other parts of the church. In some towers the angles have small turrets, or else half-turrets, with faces corresponding only to the external surface of the wall, these turrets being crowned also with the same kind of battlement. The battlement at the angle may sometimes terminate with a point rising very slightly above the level of its upper step. Any other kind of pinnacle I take to be rare and exceptional. The same may be said of stone spires of any considerable dimensions; that of St. Patrick's is modern. Nor have I seen any Irish mediæval church with an apse, nor any drawing or engraving of one; and I am inclined to think that if any specimens of this kind exist, they must be extremely rare.

The towers are usually plain, and of good ashlar masonry, mostly without buttresses, but sometimes rather tapering; often with scarce any belfry windows, but only narrow loopholes. Occasionally there is a window on one or two of the faces of the tower, the others having only slits. I have seen no instance of a lantern internally; indeed, I suspect that the tower was in most cases a place of defence. Many churches have rooms over the chancel, or transepts and their aisles, as well as in the tower. Though not abounding in ornament, the Irish churches are by no means deficient in those objects which give an interest to so many of our parish churches, as piscinæ, sedilia, tombs, and niches, and some of them are well worth attention.

But it is only of the ruined churches, chiefly monastic, that I speak; for those in use, with few exceptions, are of no interest whatever, being either altogether modern, or so modernized, as to lose every trace of their former aspect.

The churches belonging to the different monastic orders seem to preserve their primitive and distinctive type, through every change of style, much more tenaciously than those in England. For instance, the Cistertian type, which in England is nearly lost after the close of the twelfth century, is retained in Ireland to the end of the Gothic period. Few English abbey churches still present this type in its purity. I can call to mind only Buildwas and Kirkstall, and the latter of these is somewhat changed by the addition to its tower. The typical form of the Cistercian church, you are aware, comprises a long nave, a low central tower, a short choir or chancel, and a north and south transept, each having two or three eastern recesses for altars. The principal part of the abbey buildings completes a square, of which one side is the nave and another is one of the transepts lengthened. This form is adhered to in the Cistercian abbeys which I have seen in Ireland, whatever might be their date; and the abbey buildings are in every instance on the south side of the church, though there evidently is no general rule to this effect, as Buildwas and Tintern have their buildings on the north.

The other monastic type I will, for convenience, call the Franciscan, though it includes the Dominican and other orders. And this I take to be peculiar to Ireland, at least I have not noticed it, so strongly marked elsewhere. This consists of a nave, with or without a single aisle, a choir, generally without aisles, of much the same length of the nave, and a large transept on one side of the nave, to which transept is often attached an aisle nearly as large as itself. Between the nave and choir is erected a lofty tower, the lower part of which is oblong in its plan, reaching from wall to wall of the church; the upper part, whether square or oblong, is much narrower, and either rests upon arches thrown across the lower stage from east to west, above the main arches, or has its north and south sides carried down to the ground within the building, (in which case they are mostly pierced by an arch), thus narrowing the entrance from the nave into the choir to a space not exceeding eight or nine feet. This tower always looks as if it were an insertion, and, in many cases, evidently is so, as it

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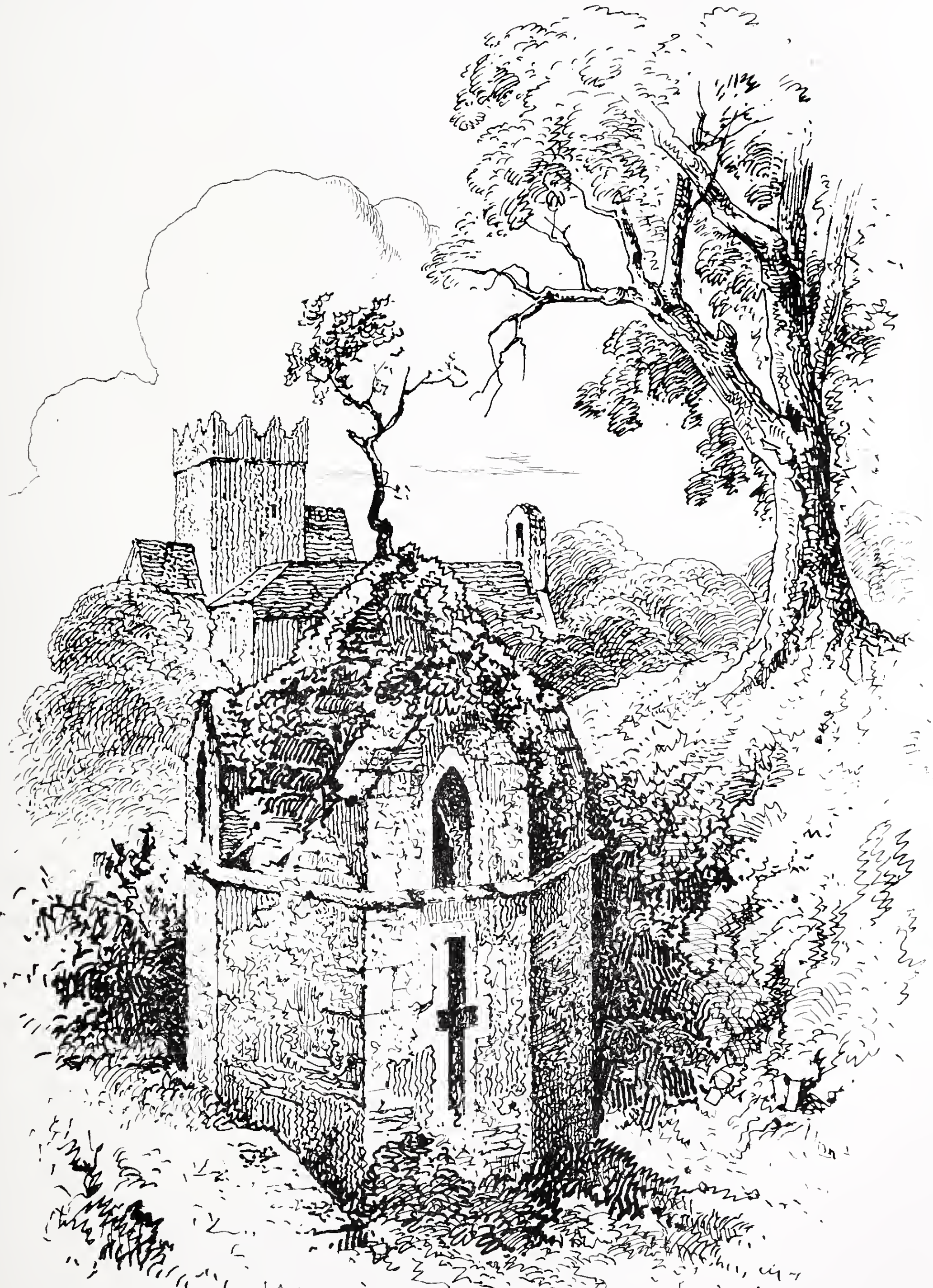
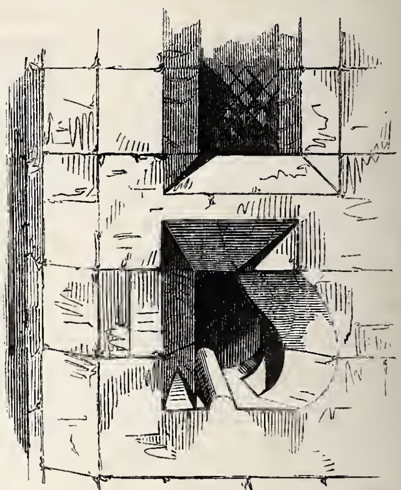


S. Doulach

cuts windows and arches in two; but in later churches it is probably included in the design, and is of the same date with the rest. It seems to have been divided by several floors, and may very possibly have been occupied as a place of safety. The side of the church, which has no transept or aisle, forms a side of the square of the monastic buildings, which are simple, and well, and regularly arranged. A cloister, of which the arches are very small, and usually pointed, and without foliation, surrounds the open space of the square. The ground plan is on the whole very compact.

It may be remarked that the roofs in general appear to have been supported by a gable at each end, and not to have been joined on to other roofs, at least where the main roof of the church was concerned, for even the transept has a gable upon the wall of the church, as well as that at its end. The Franciscan abbeys seem generally to have had their monastic buildings on the north side of the church, but by no means without exceptions. The simplicity and straightforwardness of arrangement which prevails in these buildings is worthy of notice, unless the construction by which the tower is supported may be so called, we find no complicated architectural contrivance. As it is not my intention to dwell upon the buildings which are generally well known, so much as to bring to your notice those which lie out of the general beat, and have been less frequently visited, I shall say nothing of the cathedrals of Dublin, Kilkenny, or Cashel. My first excursion was to St. Doulach, a few miles north of Dublin, on the road to Malahide. This is a small chapel with a central tower, and very short nave and chancel, which are roofed externally with stone, the pitch being very high. There is, also, a stone barrel vault internally, in which are cells corresponding with windows. On the south side of the tower is an irregular projection, forming a sort of turret. In "Grose's Antiquities of Ireland," and in most of the hand-books, this chapel is stated to be of high antiquity, but I did not see any architectural features earlier than the fourteenth century. The whole has a decorated character, to which style and date we may also refer a curious octagonal well in an adjoining field. The rail from Dublin to Cork passes Kildare, where there are some remains, and brings us to Thurles on the Dublin and Cork line of railway, Thurles is the nearest station to Holy Cross Abbey, about three miles distant. I was unfortunate in my visit to this beautiful ruin, as it rained almost incessantly, and consequently, as in many other cases during my tour, my observations were very hasty and imperfect. The abbey is of the Cistertian order, and though most of the remains are rather a late Gothic, very similar to the French Flamboyant, the Cistertian type and arrangement is preserved as fully as in specimens of the twelfth century. The central tower is low and massive, and of an oblong plan; its parapet has disappeared. It has a short choir or chancel, and north and south transepts with two eastern chapels to each. Those of the southern transept, instead of being divided, as usual, by a solid wall, have between them a screen of two arcades on shafts enriched with a spiral moulding. The space between them seems to have been intended for a monumental figure. The arches are pointed, and apparently of a late date. In the chancel are rich sedilia, or else a tomb occupying their position, having a little of the character of late perpendicular (the true perpendicular does not, I think, appear in Ireland) and consisting of three tall arches under a horizontal cornice of delicate work. The tower compartment, the chancel and north transept, are groined with ribs, but no bosses at the intersection—above them are rooms. The east window has six lights, which are trefoiled, but the tracery above, which is reticulated, has no foliation. Some of the smaller windows have Flamboyant tracery with foliation, and some without. The nave is of good length, but divided by a partition at the distance of about a square from the intersection. This partition, which does not extend across the aisles, is pierced by a plain pointed arch of a single square order, and terminates with a gable, so as wholly to cut off the eastern from the western part of the church. Probably one was conventual, the other parochial, as at Wyndham, Boxgrove, and other places. The pier arches of the nave are of one square order, very plain, pointed on the north side, and round on the south. The piers, also, are plain and square, in fact the nave has few architectural features by which its date may be determined, for the absence or narrowness of the chamfer is no proof of an early style in Ireland, as it occurs in the latest Gothic. A small lateral door presents the only remains of twelfth century work. The abbey buildings are on the south side, forming the square between the nave and transept, and extending to the south-east. There are no remains of the cloister arcade, if any existed; but one or two of the doors opening into the space are rather curious.

A drive of about twelve miles in the direction of Kilkenny (but leaving the main road for a short distance), took me to Kilcooley Abbey, which is situated in a park, to which I obtained access without difficulty. This is a Cistertian abbey in pretty good preservation, and of the usual type, though apparently of late date, at least, as far as detail is concerned. It has a low central tower, of a rather oblong plan, finished with the Irish parapet and battlement. The north transept is in ruins, the south has the eastern chapels or recesses. The chancel is short, and, as well as the transept, has a plain barrel vault. The square of the intersection has a ribbed groining. Above are rooms, as at Holy Cross. The nave is plain and without aisles. The south-west pier of the tower is pierced so as to form a kind of hagioscope, and has an open crocketted arch in its northern face. The form of one of the openings in this pier is rather curious, and it would not be easy to conjecture its meaning. The abbey buildings, which do not seem to have been very extensive, are on the south side. There are no remains of any cloister arcade. The western triplet has trefoil arches with mouldings and labels of the same form; those of Kilkenny Cathedral being plain lancets. The chancel is rebuilt in the worst modern Gothic. The tower is partly of the Twelfth Century work, and shows the outline of a transitional pointed arch on its western face; this must have been blocked up at an early period, as a door of the same date with the nave is inserted, and it has every appearance of occupying its original position. It is not impossible that the nave was built as a parochial church, when the choir was conventual. There is a railway station at a short distance from the village.



Jerpoint Abbey is about thirteen or fourteen miles from Kilkenny, and within a few hundred yards of the line from Kilkenny to Waterford. This is a Cistertian abbey of the typical form, and evidently has been of considerable importance. It has a fine and massive, though plain, central tower, which has had the usual Irish battlement with half-turrets at the angles. The chancel is short, the transepts have each two eastern chapels. The nave has rather the character of that of Buildwas in Shropshire, but some of the piers are square, with chamfered edges, others are cylindrical. The pier arches are pointed. The west end has a triplet of round-headed windows. The east end has a window of later work, apparently about the Fourteenth Century; the principal part of the church belonging to the Twelfth. The abbey buildings are on the south side, but

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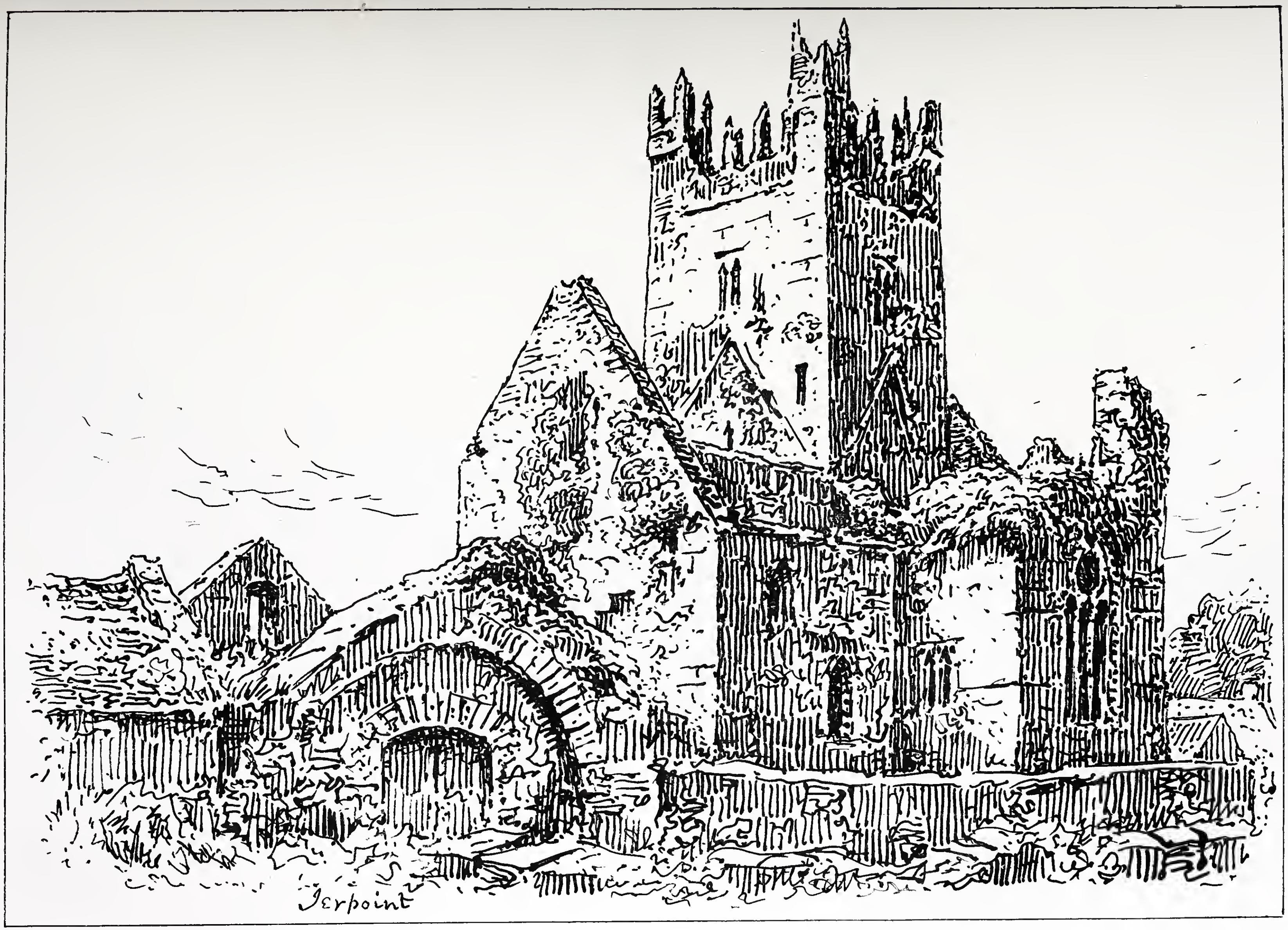

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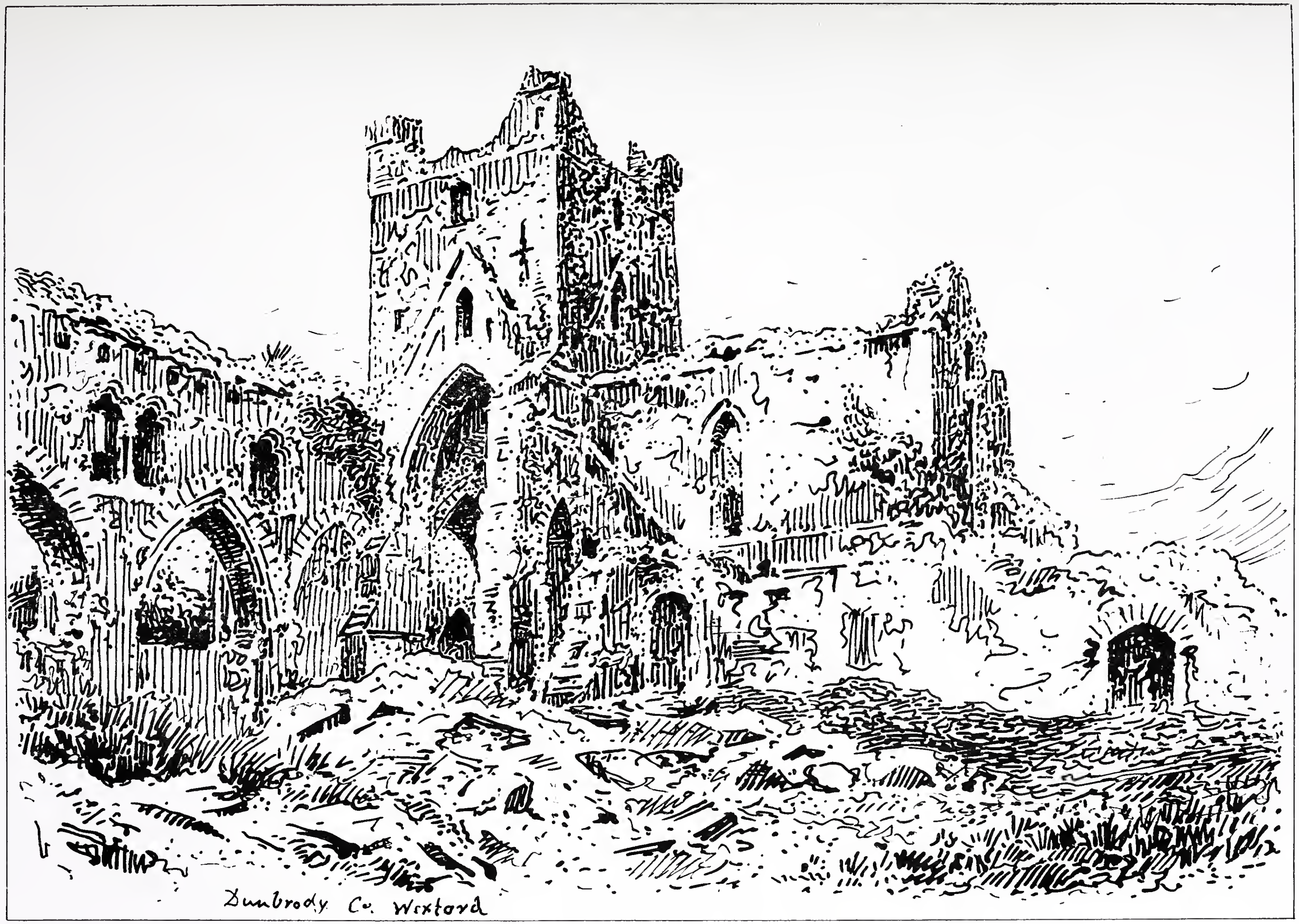

Dunbrody Co. Wexford

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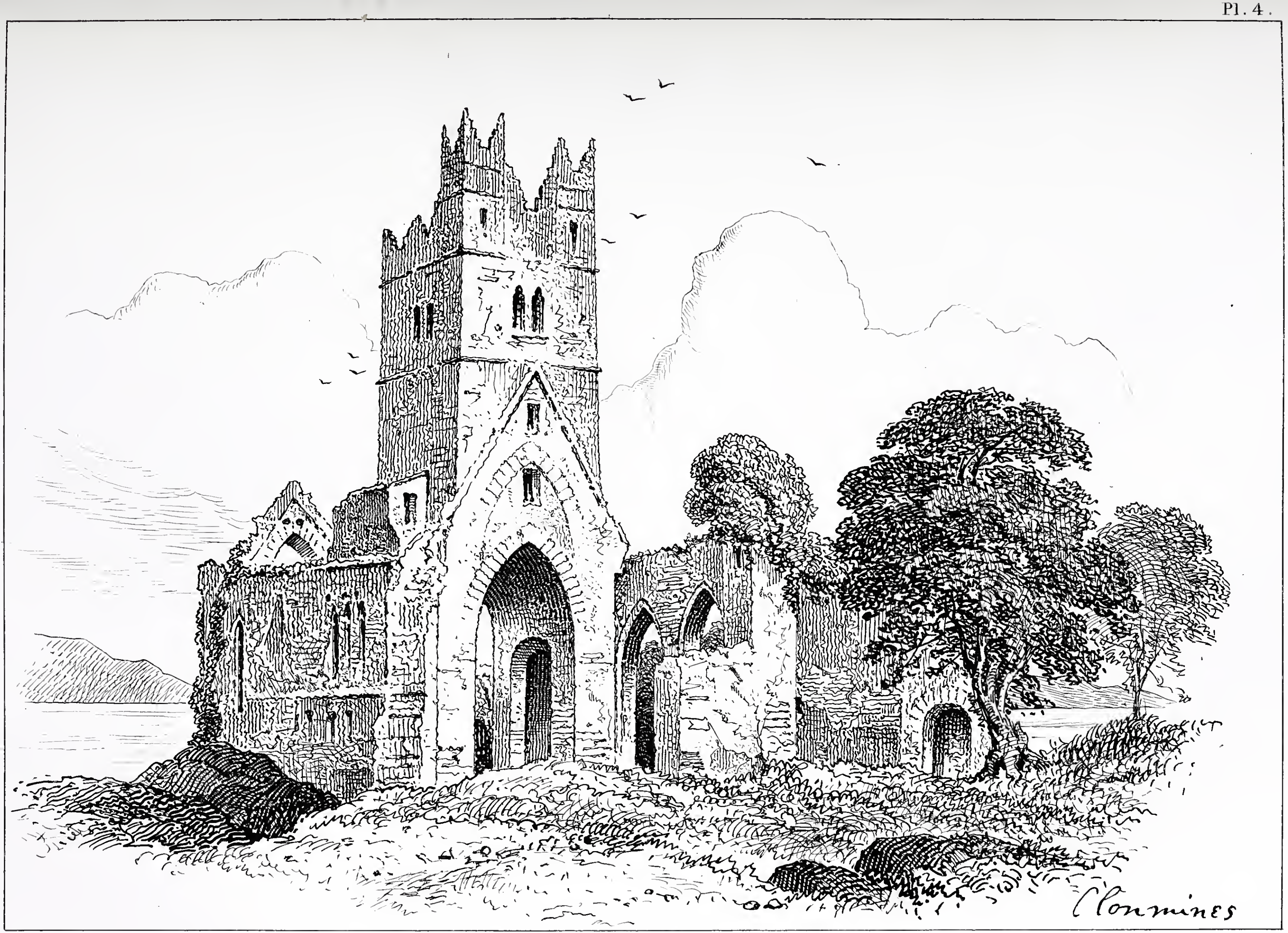


Clonmines

are in a very imperfect condition, much having been demolished, and cottages built on the spot with the material, so that it would be difficult to make out the exact ground-plan.

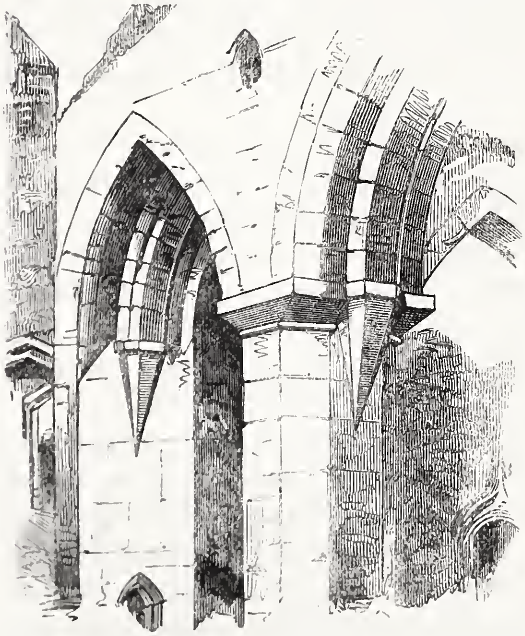
A few miles south of New Ross, near the left bank of the River Barrow, is the Abbey of Dunbrody, one of the finest Cistertian remains in Ireland. Much of the west end and south side of the church fell some years ago, but enough remains to show its former grandeur. It has a low and massive central tower, with corner turrets and the usual battlement, transepts I think longer than the chancel, and having each three eastern recesses, and a nave of five bays. The arches are pointed, of a square order with mouldings at the edges and a rib in the middle. The tower arches are very plain, and the whole of the part eastward of the nave is plainer than the nave itself, probably as forming more especially the conventual church of a strict order. The roof of the intersection (under the tower) is a plain pointed barrel roof, the axis being east and west. The transept-cells, however, are groined with good ribs. Over those of the south transept is a room. The abbey buildings are on the south side and must have been extensive. They are not very perfect, but might, I think, be traced without much difficulty. A plan is given in Grose's "Antiquities of Ireland," which seems essentially correct. The general outline and proportions of the church I thought remarkably pleasing. Not many miles from Dunbrody, near the southern coast of county Wexford, is Clonmines, which besides some castellated remains, has the ruins of a conventual church with a central tower of picturesque outline, having the usual battlement, and the corner turret on only the two angles of its western face. This tower is clearly an insertion, for it interrupts the arcade between the nave and south aisle, and its piers encroach a good deal upon the area of the nave. These piers are very plain and without much architectural character, the roof beneath the tower being a simple cylindrical one. The chancel is large, and seems mostly to belong to the Fourteenth Century. A part of the nave having been destroyed since the sketch was taken which is engraved in Grose's Antiquities.

Between this and the ferry to Waterford is the Cistertian Abbey of Tintern, an off-set of the well-known English Abbey of the same name. The nave of the church is turned into a dwelling-house, and the chancel, though now cleared, seems to have been used for secular purposes at least as early as the Elizabethan period. Before that time there must have been much alteration, for the north transept is gone, and a buttress of by no means a modern date is built on the spot occupied by one of its walls. The aisle of the south transept remains, and has the usual chapels, and a room above. The monastic buildings were on the south side, but are almost wholly demolished. Even in its present condition the pile has a picturesque outline, as the tower, which is low and massive, is tolerably perfect.

Hore Abbey, near the rock of Cashel is of the Cistertian type, and has a massive central tower, long nave, short chancel, and eastern chapels to the transepts. A division is carried across the nave at a short distance from the tower, as at Holy Cross. The abbey buildings are on the south side. The earliest part seems to belong to the Thirteenth Century. In the town of Cashel are the remains of a Dominican abbey, which has a church with a low central tower of an oblong plan, probably the base of a loftier structure, and a southern transept. The nave and chancel are nearly equal in length, and the date appears to be of the Thirteenth Century, but with later additions and insertions. Little remains of the monastic buildings which were on the north side.

At the distance of seven or eight miles from Cashel, in the direction of Tipperary, is the extensive and very curious Abbey of Athassel. The church is of great length and has a central tower, and transepts, but is much ruined. The nave is so completely separated from the tower, that I could not make out even whether the latter ever had a western arch; if it had, it is completely blocked up and presents a fine door, much of the date and character of the other architectural features. We have already remarked a similar arrangement at Gowran. The tower is low and massive, and exhibits the remains of a barrel roof, the wall from which it springs partially blocking out the south transept. The choir is a long one, and has lancet windows. I should not think this was a Cistertian abbey, from the arrangement of its monastic buildings, which are less simple. These are on the south side and extend considerably to the westward. At the western extremity is a large building which might be a hall or refectory, its greatest length being from north to south. There is also a building like a chapel that runs parallel to the church. I much regret that the weather prevented me from examining these remains carefully, but it would have taken a long time to make anything like an accurate plan of them. I should strongly recommend any architectural tourist to make a point of visiting this very interesting abbey, if it should lie near his route, and giving it special attention. It is not a very long drive from Tipperary, whence the rail takes us to Limerick. The Cathedral of Limerick has a western tower, of which the upper part seems to belong to the Fourteenth Century: it may be later. The angles have square turrets. The interior shows several additions and re-arrangements, the earlier part being transitional. Much restoration, as I suppose we must call it, is going on, and the interest becomes proportionably decreased.

In the park at Adare, about eight miles from Limerick, is a very perfect and beautiful specimen of the Franciscan type. It belonged to the Augustine order, but is precisely similar to many of the finest Franciscan monasteries. The church has a nave with a southern transept, which has deep eastern recesses or chapels, and a western aisle divided from it by three pier arches. This double transept opens into the nave by two arches resting on an octagonal pier, the capital of which, however, has a square abacus. The arch is chamfered, and has a lower order, also chamfered, which rests on a plain projecting bracket, which tapers downwards to a point. This bracket I take to be one of the peculiarities of Irish Gothic. The west end has a triplet of lancets, which may be of an early English date, but, I think, are not necessarily so, for in Ireland late work often presents what elsewhere would have been called early features. In several parts of the church, as well as in the usual position of the sedilia, are recesses like sedilia, with ogee canopies, apparently of a late date. The central tower is lofty, slender, and of an oblong plan—much narrower than the nave or chancel, but resting on a base which, as regards ritual purposes, forms a complete separation between those two parts of the church, the arch beneath the tower being very narrow. The tower may have been an insertion, though I am not so clear about it as I am in other cases. But I must again remind you that my examination has always been of a rapid and cursory nature, my object being rather to obtain general ideas, by glancing at a number of examples, than to investigate carefully a few.



The abbey buildings are on the north side, and have cloisters enclosing a small area, and with low and narrow arches.

I did not look into the other church, which has been restored and fitted up for service, but its original character seems to have been preserved. This was Franciscan. Part of the conventual buildings, on the north side, is preserved. There are, also, the remains of another church, with a low massive central tower of good outline, without transepts. The chancel and other parts are rebuilt, and used as a Roman Catholic chapel. There is a railway station at no great distance from Adare. Killaloe may also be visited by rail, and is worth the excursion, on account of the surrounding scenery, as well as its cathedral. This is a pure early English cross church with a massive central tower. It has no aisles, and the choir is of a good length. The building has not suffered very much from restoration, though the parapet of the tower is evidently not quite in its original state. The windows are lancets, very tall and narrow, at the east end they form a triplet; in the transept front is a single window. On the south side of the nave is a Norman arch of several orders, much enriched with the chevron and other mouldings. In the church yard is a chapel, with a high pitched stone roof, it has a Norman western door, and windows with the straight-sided arch in the sides. There is a rounded barrel roof without ribs, above which is a room. I suppose the date to be not very different from that of Cormac's chapel at Cashel—namely, about the twelfth century.

Another specimen that can be visited from Limerick is Askeaton. The distance is fourteen or fifteen miles by road, but there is, I believe, on the line from Limerick to Foynes, a station at no great distance. The abbey is Franciscan, and dates only from the middle of the fifteenth century, though some of the mouldings might be pronounced earlier. This, however, as I have already remarked, is no uncommon thing in Ireland. Here the church is without the central tower, and it does not appear that any has been intended, though, in point of size and architectural excellence, the monastery might rank among the most important of that order. The abbey buildings are to the south, consequently the transept is to the north; adjoining to it is a mass of ruin which may possibly be the remains of a lateral tower. The cloisters are perfect, and more enriched than we find them in many instances. The arches spring from a pier composed of two shafts set transversely, and joined by masonry, the capital being carried round the whole. In some of these piers a kind of toothed ornament is introduced. The north transept has a western aisle. In the village are the remains of a castle; also, a ruined brick house, apparently belonging to the end of the seventeenth century, or even later. It is extremely picturesque. Kilmallock lies near the line from Dublin to Killarney, and has a station near the town. By carriage road it is about fifteen miles from Limerick. Here is a curious old church (still used for service), which I had not time to examine. It has a round tower, perhaps, the remains of one of those for which Ireland is noted, and appears to have details of the thirteenth, and possibly the preceding century. My time was taken up by the Dominican abbey, the church of which is extensive, consisting of nave and chancel nearly equal in length, and a large south transept. (for plan of this Abbey see plate No. 14, taken from drawings and measurements by Mr. Gordon Hills.) The east end of the chancel has five fine lancets, and on the south side are six windows that seem to have had two lights, and to belong to rather an early period of the decorated. Part of the central tower remains, which is very lofty, and evidently inserted, as it cuts a window in two. The lower part is, as in most other cases, much wider than the upper part, and is pierced by tall and very narrow arches. The abbey buildings are on the north side, but not in a good state of preservation. There are several objects of interest in the town, which requires a longer visit, and more attention than I was able to give.

We will now proceed northward, in the direction of Galway, taking in our route Ennis, which is reached by rail in less than two hours, the line passing in sight of two extensive and picturesque ruins, the abbeys of Quin and Clare. Part of the abbey church of Ennis is used as the parish church, and has been disfigured by pinnacles. It is of the usual Franciscan type, and has the southern transept.

The Franciscan abbey of Quin is about six miles from Ennis. (for plan see plate No. 13, from drawing by Mr. Gordon Hills). It is strikingly similar to the abbey at Adare, which has been already noticed, and is very perfect, in fact has undergone little mutilation beyond the loss of its roofs. It has the large south transept, and tall slender central tower, with arches not more than eight feet wide, the width of the nave being about twenty-four. The roof of the tower compartment is groined. On the north side of the chancel, in the position generally assigned to the Easter sepulchre, is a tomb or shrine of three trefoil arches, apparently of a late date, in fact I did not notice any architectural features which might not belong to the fifteenth century. The cloisters are plain, and have small arches, some of the shafts have a spiral moulding. This abbey seems to have been fortified, as there are large round towers flanking the eastern side.

Clare Abbey, still nearer to Ennis, forms nearly a perfect square (externally), the church occupying the north side. This differs from the usual plan, in having no transept. I think the central tower is an insertion. The interior of the abbey square is a mass of ruin, which might doubtless be made out without much difficulty, except what arises from the roughness of the ground, and tangled grass and bushes.

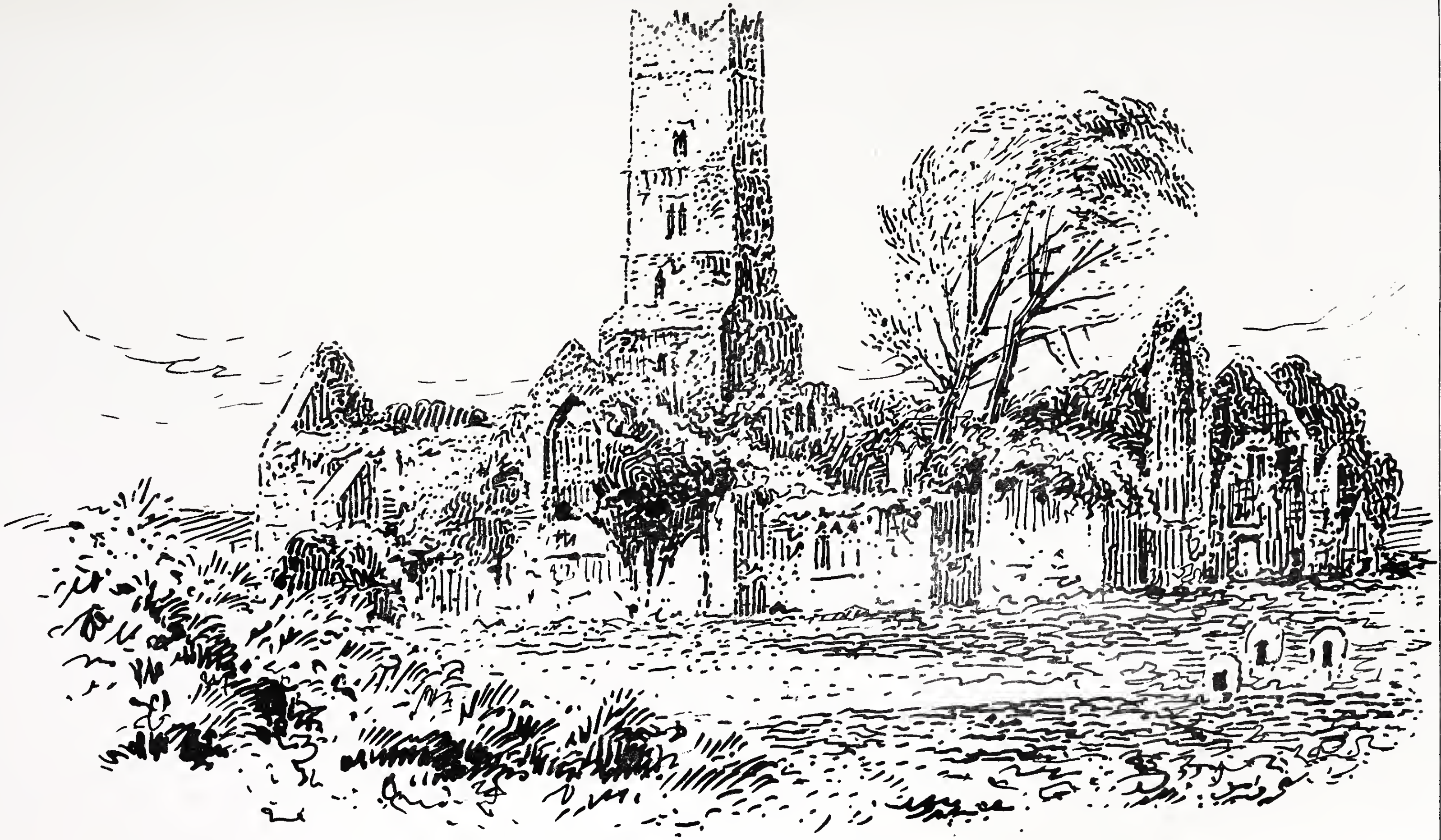
The line of railroad at present carries us no further north towards Galway, and which is distant from Ennis about forty miles. The parish church of Galway is, except in its fittings, in its original condition. It has a nave, with two large gabled side aisles, transepts, of which the south one is of considerable length, a chancel, and a central tower with a kind of wooden steeple. There is not much ornamental detail worth studying. Most of the windows have a Flamboyant character. I should be inclined to set down the date near the end of the Fourteenth Century. I was somewhat disappointed in the town, as I had heard much of its antiquity. The house called Lynch's Castle has some good ornament, and is decidedly of a foreign character. But my time was given up rather to excursions from the town than to investigations in it.

The ruins at Athenry and at Kilconnel can both be visited by the railway which runs from Galway to Athlone and Dublin. The first object we notice in Athenry is a cross church, of which the nave and transepts are still in ruins, and the central tower and chancel are rebuilt, and used for service. Beyond this is the square keep of a castle, and outside the town, to the eastward, are the remains of a fine Dominican abbey church, consisting of a nave with a north aisle, a large north transept, a large chancel, and a fragment of the central tower (an evident insertion) which fell, I understood, seven or eight years ago. The style of the building is that of the Fourteenth Century. There has been a large east window with fine decorated tracery. At present a smaller one, of a common Irish pattern, is inserted. The side windows are tall and narrow. The remains of the tower arch exhibit some work which would have been pronounced early, a sort of toothed ornament, but this occurs elsewhere in work that has indications of lateness: and, as I have observed, there can be no doubt this tower was inserted, as it breaks in upon a side window. There is some curious detail in the nave of decorated character.

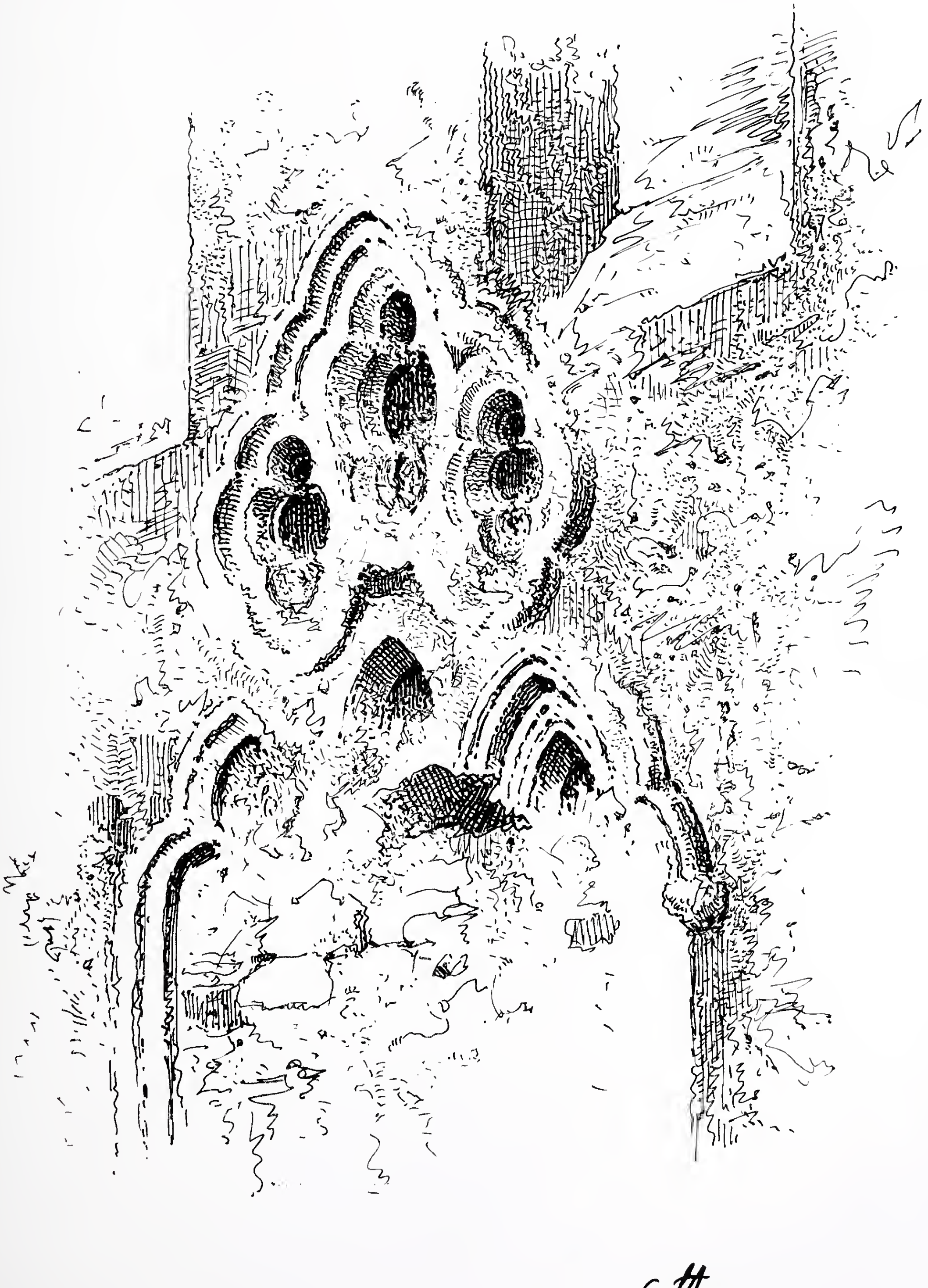
Kilconnel is within a mile or two of the Woodlawn station, and must be visible from the line. The abbey is of the Franciscan order, and is a very fine specimen. The church, though unroofed, is in other respects very perfect. The abbey buildings are less so, but still of much interest. Part of the cloister arcade remains. The church, as usual, forms the south side of the quadrangle, and has a nave, a large southern transept with a western aisle, and deep eastern recesses or chapels, and a chancel rather exceeding the nave in length. The fine central tower, I think, belongs to the original design. The arches supporting it are somewhat larger than most of those we have hitherto noticed, and their imposts more completely worked into the side wall. The oblong base of the tower rises well above the roofs, and the superstructure rests upon arches springing from the walls above the main transverse arches. The square compartment beneath this upper tower is groined with ribs. From the account in Grose's Antiquities, this building seems to belong to the beginning of the Fifteenth Century, a date warranted by its architecture.

The abbey of Clare, Galway, is about seven or eight miles from Galway, in the direction of Tuam. This is also Franciscan, and has a lofty square central tower later at least than the nave, which is of

Pl. 5.



Kilconnel Co. Galway



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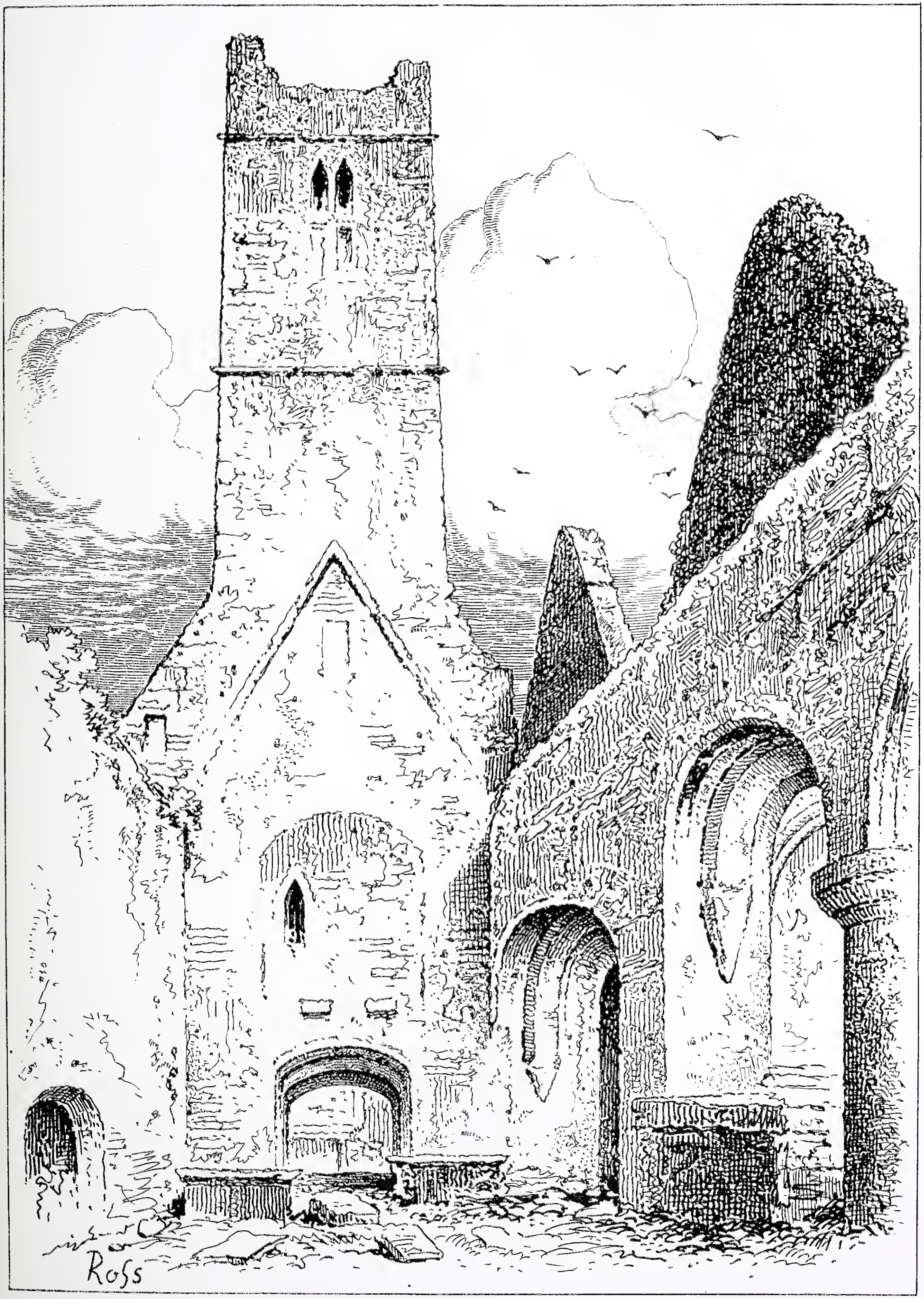
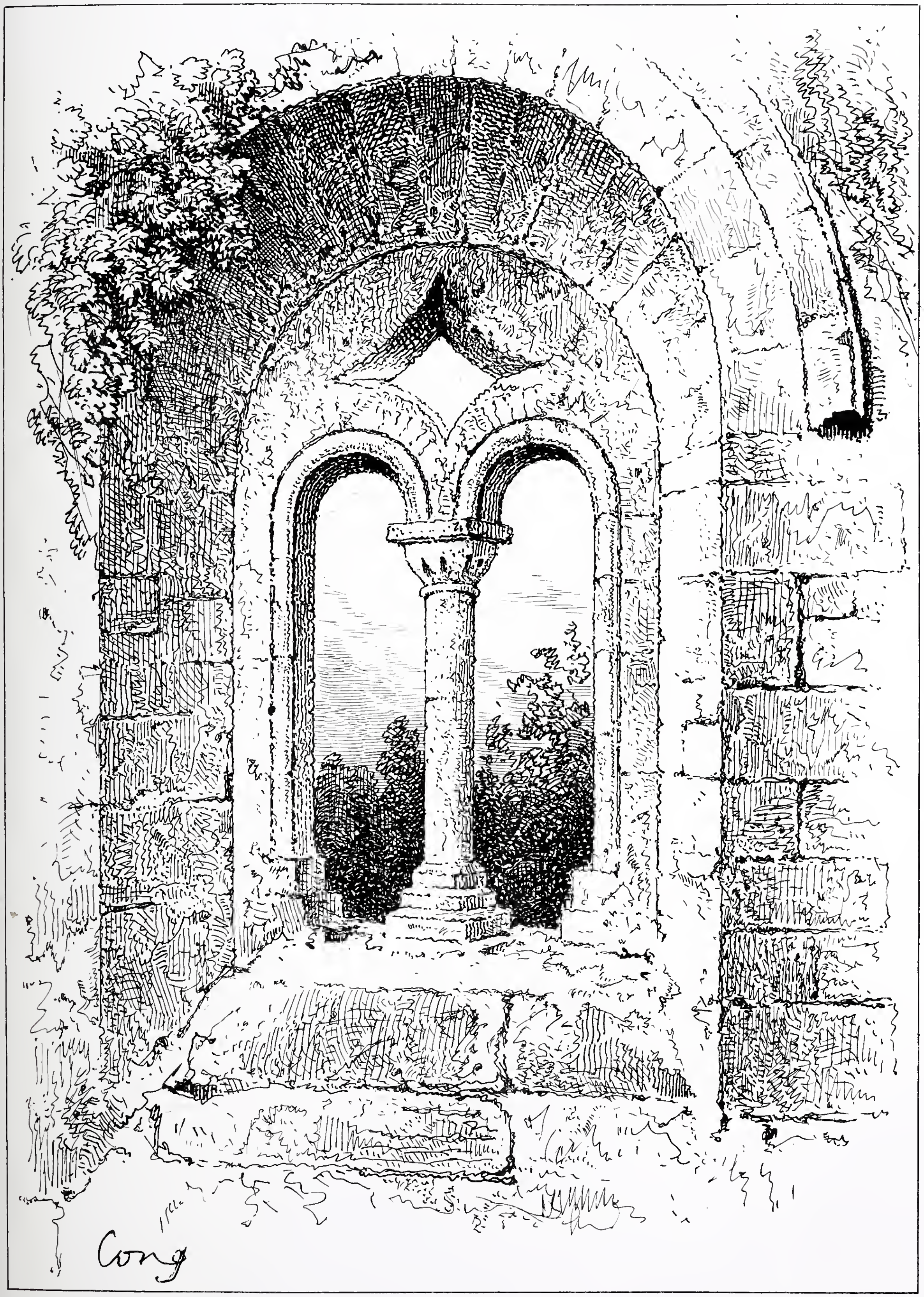

Ross



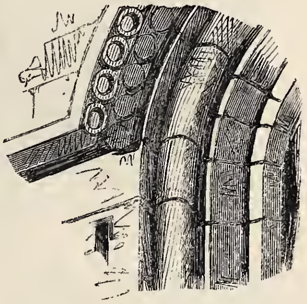
Cong

early English character. The nave had a north aisle with pointed pier arches of two chamfered arches, on cylindrical columns. There is a small north transept, now used as a chapel, which corresponds with the tower. The chancel, as usual, is large. The abbey buildings, which in their present state are highly picturesque, but not very perfect, are on the south side. From this point we may go, in one direction to Ross Abbey and Cong, in another direction to Abbey Knockmoy and Tuam.

Ross Abbey is extremely perfect, though unroofed; it is of the Franciscan type, with a lofty central tower, through which the opening into the chancel is by a low and not very wide segmental arch. There appears, however, to have been a somewhat wider and loftier arch originally. The present arch has an altar on each side of it, on the western face. The nave has no aisle, but a large double transept on the south side, divided by an arcade of pointed arches. This transept has two high-pitched gables in the south front, with two corresponding gables on the wall of the nave, at the other end of the roof. This has been noticed as a general arrangement. The cloisters are small, both in area, and the size of their arches, which are plain, and have piers of an oblong form transversely, with the edges chamfered. I did not notice any architectural features earlier than the end of the Fourteenth or beginning of the Fifteenth Century. The abbey buildings are on the north side.

Cong Abbey has some transitional and early English work, but some parts have been repaired; an operation necessary, perhaps, for preserving the remains, but by no means increasing their interest. The west end of the church has a triplet of lancets. There appears to have been no central tower; if there ever has been one, every vestige of it is gone, and it is not easy quite to make out the plan of the church, but I think it had the south transept. The abbey buildings are to the north, and have some curious round-headed windows of two lights divided by a shaft, and a quadrilateral opening in the head. This abbey was one of great importance, though the remains are now not very extensive.

Abbey Knockmoy is Cistertian, and must have been a very noble building. Two arches of the central tower remain, which are pointed, of two plain square orders: evidently of transitional date; their span is near thirty feet. As usual, the nave is long, the chancel short, and each of the transepts has two eastern chapels or recesses. The tower itself has almost disappeared. The nave has had aisles opening into it by four large pointed arches at considerable distances, making the piers oblong in the direction of east and west. The chancel is vaulted, and has square diagonal ribs. The east end has a triplet of round-headed windows with enriched labels. The abbey buildings are on the south side, and the chapter house has a window of some richness.



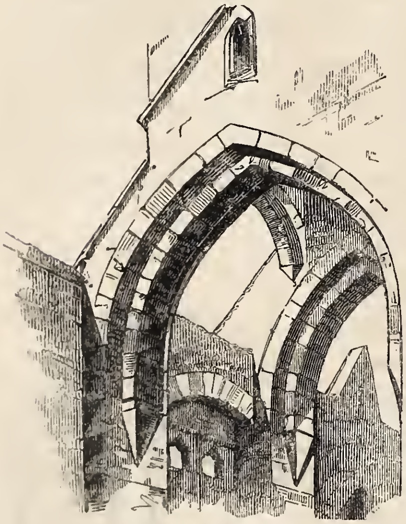
The cathedral at Tuam is about to be demolished, the new building being commenced to westward. A fine Norman arch, now forming the west entrance, will, I understand, be preserved in some manner. The present choir is rather a fine bit of Fourteenth Century work, having somewhat of a castellated character. It seems a pity to destroy it.

Ballyitober Abbey is not easily found, and, as I thought, not worth much when it is found. Its repairs amount almost to a restoration, as far as the walls are concerned, all the gables being finished up nearly to their points. The church, however, really has been a very fine one; of the Cistertian type, though not, according to Grose's Antiquities, belonging to that order. The nave has no aisles; the transepts have eastern chapels; the chancel is short and vaulted. The tower arches are pointed, and of transitional character. An eastern triplet of round arches is enriched internally with chevrons, and has a curious arrangement of shafts. There are remains of abbey buildings at the south side.

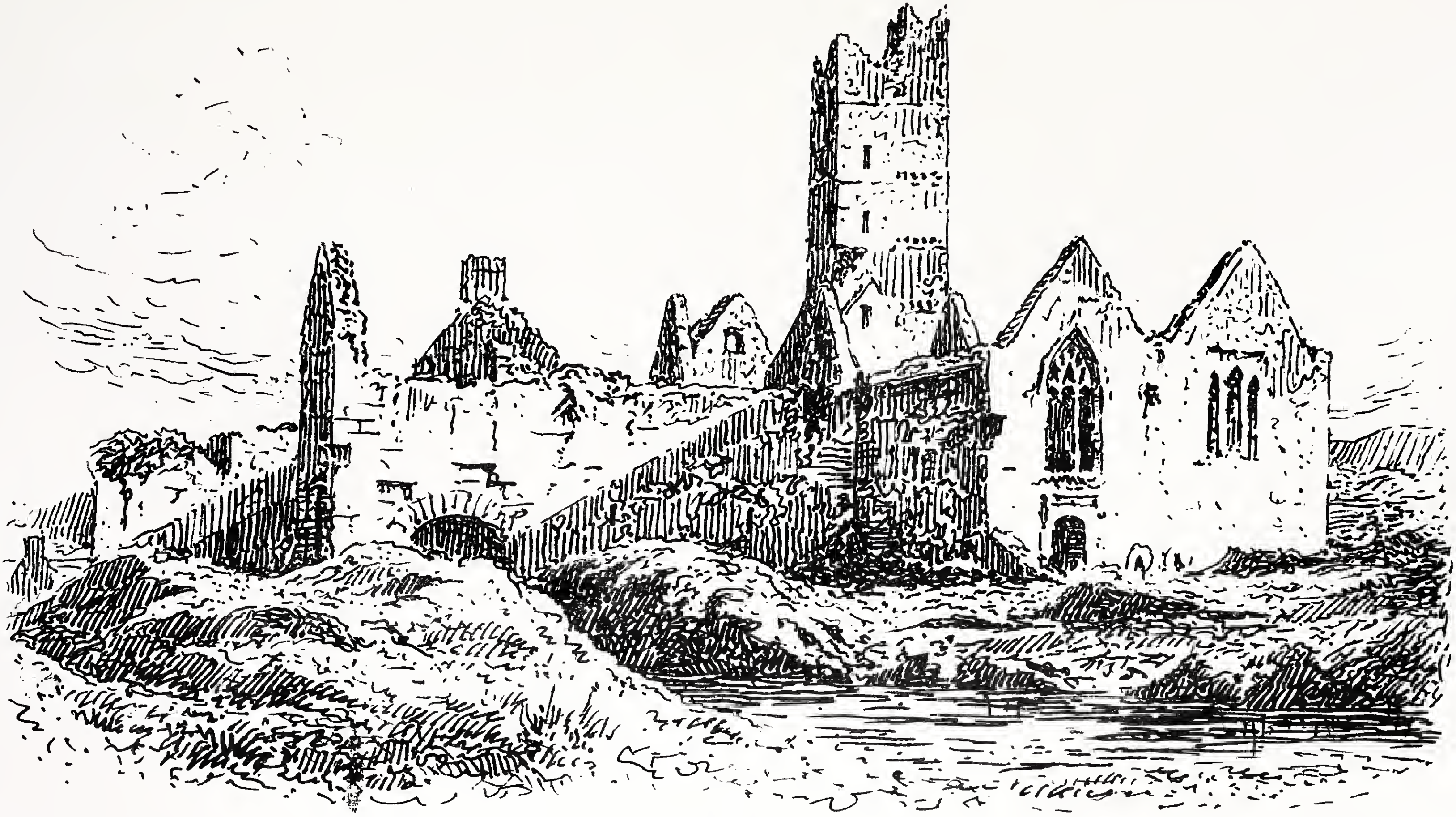
Near the western coast of Mayo, about twelve miles from Castlebar, and not quite two from

Newport, is Burrishool, a ruin most picturesquely situated. On first approaching it you might mistake it for a church of the Cistertian form with a massive central tower. That, however, which you take for the nave you find to be the range of abbey buildings on the north side. The front facing you is the east end, and what appeared to be the chancel is a south transept; the west gable of the nave appearing beyond the tower. The tower, as it stands at present, is of an oblong plan from north to south, it rests upon narrow and not very lofty pointed segmental arches. On going up the staircase we find the area divided into three compartments, from which it may be inferred that this oblong tower is merely the base of a loftier one which surmounted it as in other churches of the Franciscan type. A small part of the cloister remains. I did not notice any features earlier than the fourteenth or fifteenth century.

After returning to Castlebar, I proceeded northwards to Ballina, for the sake of the Abbeys of Roserk and Moyne, which, though perhaps the latest in date of those I visited, were, as I thought, the most interesting and instructive of any. Roserk, or Rosserick Abbey is about four or five miles below Ballina, on the bank of the river Moy, and though not very large, nor containing any elaborate work, is worth notice on account of the simplicity and excellence of its design. It is of the Franciscan type, the church having the large south transept, and the tall slender central tower, which I am inclined rather to attribute to the original design, than to set down as an insertion. The arches beneath it are much wider than usual, the piers or imposts not projecting much into the internal area of the church; and the arches under the north and south sides of the tower spring boldly from the walls above the transverse arches. All these arches are pointed, with two square orders, the inner one resting on a bracket which comes to a point against the wall or pier. The tower with its supports are of good ashlar; the walls of the church have somewhat rougher masonry. The windows seem to have had better tracery than we find in many examples. The abbey buildings are on the north side, and I think there have been no cloisters, at least no traces appear in the square usually occupied by them. The secluded position of these ruins, in a hollow among some low hills, adds much to their picturesque beauty.

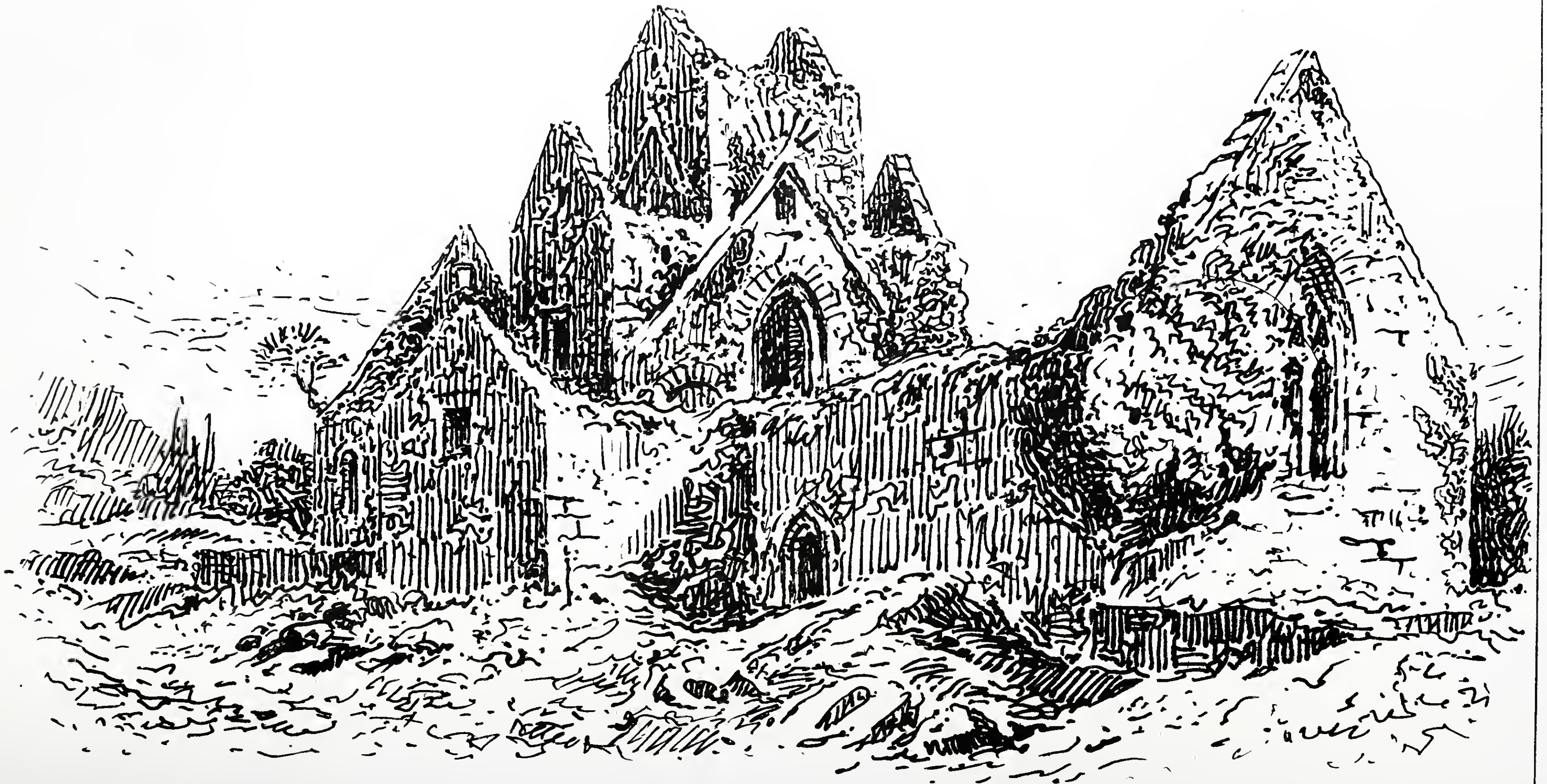


At two or three miles distance, on the mouth of the same river, is Moyne Abbey, so late in date that the west door, which hardly looks like an insertion, is revived Italian in its style, though all the rest is decidedly Mediæval. The church is a very spacious building, with a nave and large south aisle, south transept, chancel, with a sacristry and central tower, which may very well be of the same date with the rest. The arches which support it are neither so wide nor lofty as at Roserk. The tower has, as usual, an oblong base, which on the south side is carried up as a staircase turret, ranging with the south wall of the chancel, and with the western sides of the tower; and rising above the parapet of the same, so that in fact the whole tower is of an oblong plan, and has a remarkable and very picturesque outline. The parapet, which has the usual battlements, is very complete, and the roof of the tower is of stone. The windows are small square-headed slits. The abbey buildings, on the north side, are very perfect, and of much interest. The pier arches of the church are of great width, round, of two square orders, and rest upon octagonal shafts with capitals of more an Italian than Gothic character. There is a piscina in a niche, curiously cut out in the angle of a pier, forming two pointed arches on a square shaft. This is a feature I have seen in other Irish abbeys. The situation of Moyne Abbey is

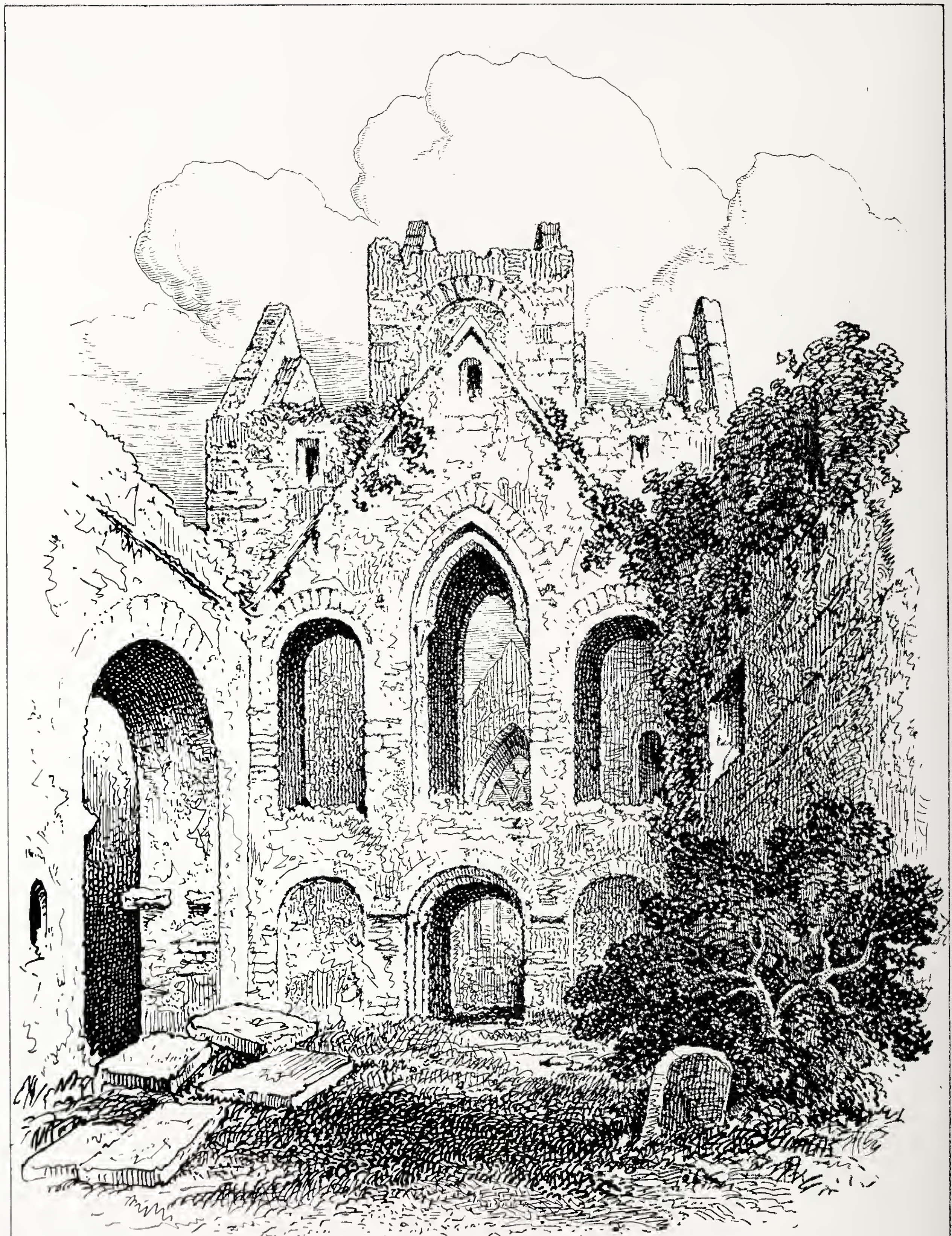


Mayne Abbey

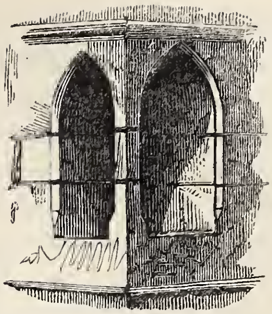
Pl. 10.



Ballindown Abbey



Ballindown



extremely pleasing: it stands near the sea, to which a small stream finds its way under a part of the building. Killala is about two miles from Moyne. It has one of the most perfect round towers that remain. I made rather a round from Ballina to Sligo, for the sake of the remains of Bennada and Court. I did not regret it, for it took me through some very beautiful scenery; but the ruins themselves were hardly worth the journey, as they consist of little beyond their towers. Bennada is surrounded by wood; it has a slender tower and ruined chancel; the nave is wholly destroyed. At Court is a nave and south transept, a tower partly in ruins, and the remains of a chancel. I do not suppose they present any feature with which we are not already familiar.

At Sligo are the remains of a large Dominican Abbey, of which the church has a nave with a south aisle and transept, large chancel, and a central tower, which is clearly inserted, though the arches below it are large and lofty. The architectural details are somewhat more elaborate than usual. An east window of four lights, with reticulated tracery and foliated openings, is still perfect. The abbey buildings, on the north side, though part of them is destroyed, are still extensive, and appear to be worth examination. Much of the arcade of the cloisters, which seem to have occupied a larger square than in Franciscan abbeys, still remains (for view of a portion of these Cloisters by Mr. Gordon Hills, see plate No. 13). A drive through very beautiful scenery, round Lough Gill, enables you to visit Crenelea Abbey, close to the town of Dromahaire. To find it, however, you must ask for Friarstown, the name of the demesne in which it is situated, where I was received with great kindness, as I believe a tourist would be in pretty nearly every house in Ireland, and enabled to examine and sketch to my heart's content. This abbey is of the Franciscan type, and has a nave with south transept, chancel, and the lower part of a central tower, on not very large round arches, of two slightly chamfered orders, the lower one resting on a bracket. I think the upper part of the tower must have been something like that of Moyne, that is, furnished with a staircase turret to the south, ranging, on its east and west sides, with the tower itself. The abbey buildings are on the north side, and a good portion of them still remain. I could see nothing earlier than the fourteenth or fifteenth century.

On the way from Sligo to Boyle, it is as well to diverge and go along the eastern bank of Lough Arrow, for the sake of Ballindown Abbey. The church only remains. As its transept is on the north side, I must infer that the abbey buildings were to the south, though the ground rather indicate traces of something on the north. There is, however, rather a rapid slope at a short distance to the southward. So it is not impossible that, contrary to the usual custom, both the transept and abbey buildings may have been placed on the south side. And this church is peculiar in other respects. The lower part of the tower, which is oblong from north to south, forms a fine screen of two tiers of arches across the church, between the nave and chancel. Of the lower tier only the central arch is now open, which, as as well as the others, is round-headed. The upper tier consists of a pointed arch between two round ones, all open; the central arch is of two square orders, the lower one resting on brackets. This part of the tower has gables, to the north and south; so also has the central part, which is not very lofty. The outline is extremely picturesque, more so, probably, than if the roofs still existed. Notwithstanding the round arches and square orders, the date of the whole seems not earlier than the fourteenth or fifteenth century.

Our next object is Boyle (for plan of which by Mr. Gordon Hills, see plate No. 14); the largest and finest Cistertian Abbey in Ireland. Though it occupies a beautiful position, it is unfortunately so surrounded with trees, as to make it difficult to obtain a satisfactory sketch. Besides which, as in many other Irish ruins, the luxuriance of the ivy very much disguises the architectural forms. The nave has eight bays. The arcade of the south side is nearly perfect; the round arch of three square orders prevails in it. Four of the piers nearest the transept are columnar, the others are square, with chamfered edges, and have shafts on the eastern and western faces, and brackets on the north and south. The clerestory windows are round-headed. The arches on the north side are pointed, transitional; but are much blocked up and otherwise disturbed. Three of the tower arches are round; that of the chancel is pointed, and lower than the others. It has three orders, square, and springing from shafts with the square abacus to their capitals. The eastern recesses of the transepts have pointed arches, but the windows are round-headed. The chancel, which is short, has a plain barrel roof, and a good triplet of lancets. Many of the horizontal strings are plain, with a simple rectangular section. This is not common in Mediæval church architecture, though we often meet with it in classic, and in Moorish. The abbey buildings are on the south side, and occupied a pretty large space of ground. I should think they might easily be traced out. There are no remains of any cloister arcade. The remains of Clonshanville Abbey, near Frenchpark, consist of little more than the central tower of a church. They are scarcely worth a detour, except as a picturesque bit.

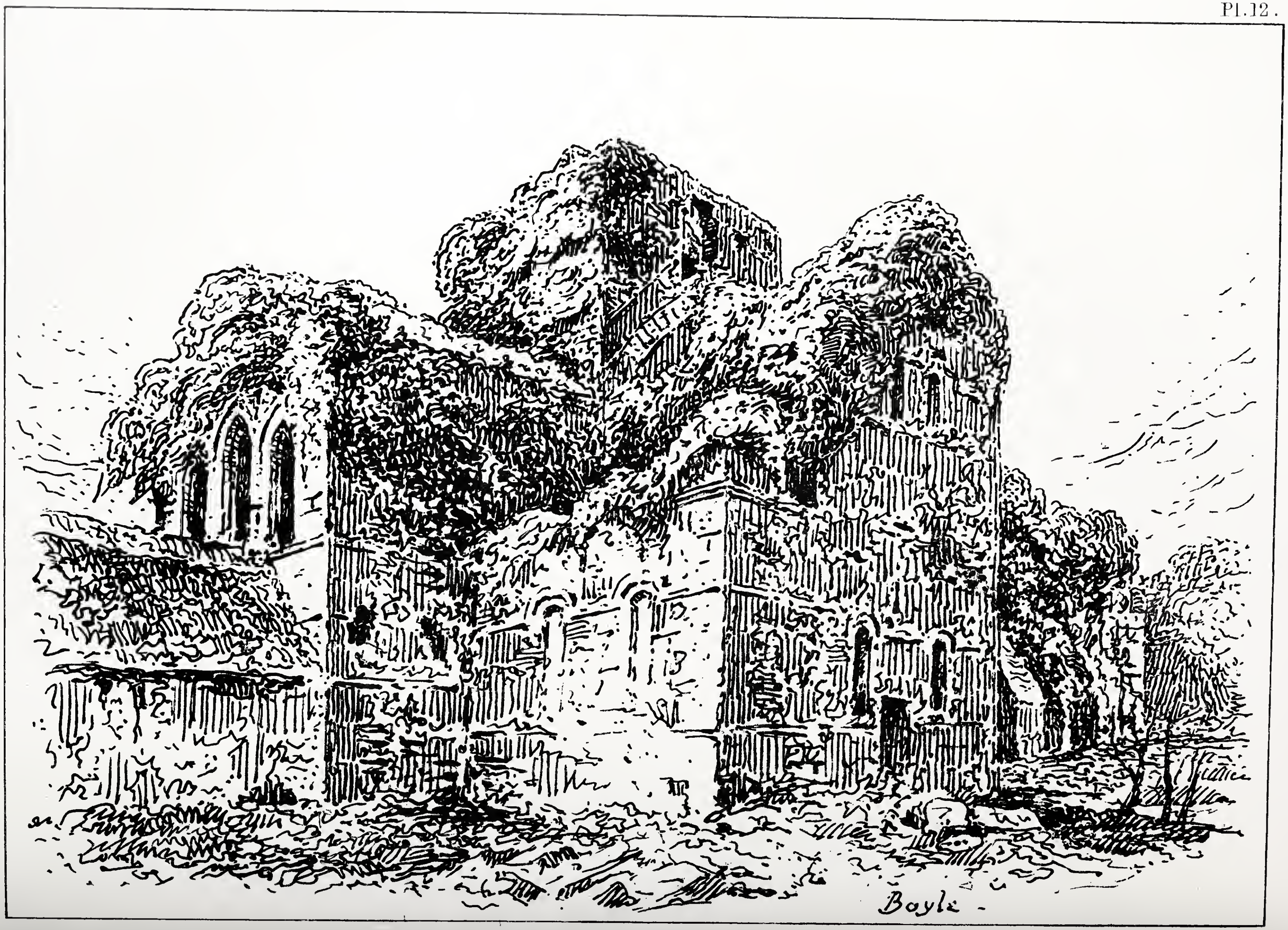
Roscommon has the remains of a Dominican conventual church. Grose's "Antiquities" give a central tower, of which not a trace now exists. From Athlone I visited Clonmacnoise, which has the remains of several small churches, two round towers, and a very rich cross. One of the round towers is engaged in the chancel of a small Romanesque church, and is supposed to be of later date. This I am inclined to doubt, and think it more likely that the chancel was annexed to the tower. Irish church-builders preferred the square form to the round, and in this case it would manifestly have been the more convenient of the two.

I have no doubt I have missed many good specimens which I might have visited easily had I known of them, but I think those I have named will be found to comprise some of the best. My sketches will I hope give you an idea of their general character, and this is of more consequence than their details, which though not altogether uninteresting or uninstructive, would not make a very important addition to the Mediæval specimens which are so abundantly collected from other sources.

But I must allow that I have not treated the subject in the historical and archæological manner that it requires and deserves. This is a task I must leave to some more competent person. You will observe I have used the term abbey in a general sense, as meaning any foundation of a conventual or collegiate character. And I have only referred to different monastic orders so far as the very strongly marked architectural types obliged me to do so. The fact is, I have not studied the subject; and an essay on Irish architecture, to be complete, ought to go into it very thoroughly. I have had a letter from Mr. Freeman, to whom I wrote requesting him to give me any hints he could, from which I see that I have been struck by the same peculiarities which attracted his attention. He remarks, that English, as distinguished from continental, peculiarities, are exaggerated in Irish buildings, and instances the rareness of the apse, and of vaulting; and that Ireland is the best country for studying the differences between the churches of different monastic orders. I trust he may be induced some day to go more fully into the subject, on which his historical and antiquarian knowledge will enable him to throw considerable light.

THE CHAIRMAN, Mr. TITE, M.P., President, said he was certain that he only expressed the general feeling of the meeting when, on their behalf, he begged Mr. Petit to leave the drawings at the rooms of the Institute for a few days, in order that they might be inspected by the members. His (the President's) own acquaintance with Ireland had been more of a professional than of an antiquarian character, but he had been struck with some of the peculiarities in those structures which had been adverted to by Mr. Petit. The architecture appeared to be extremely rude, and of a very peculiar type. There was

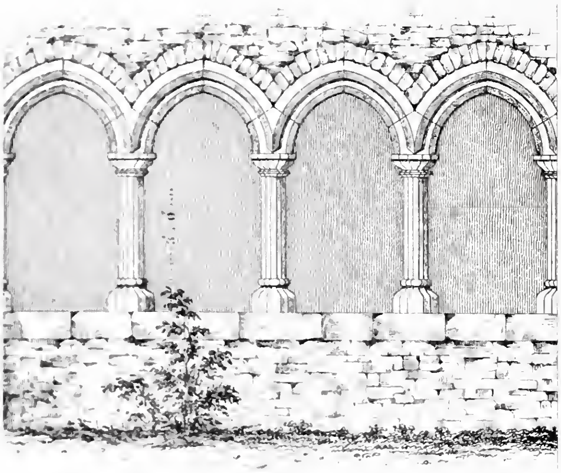
Pl.12.



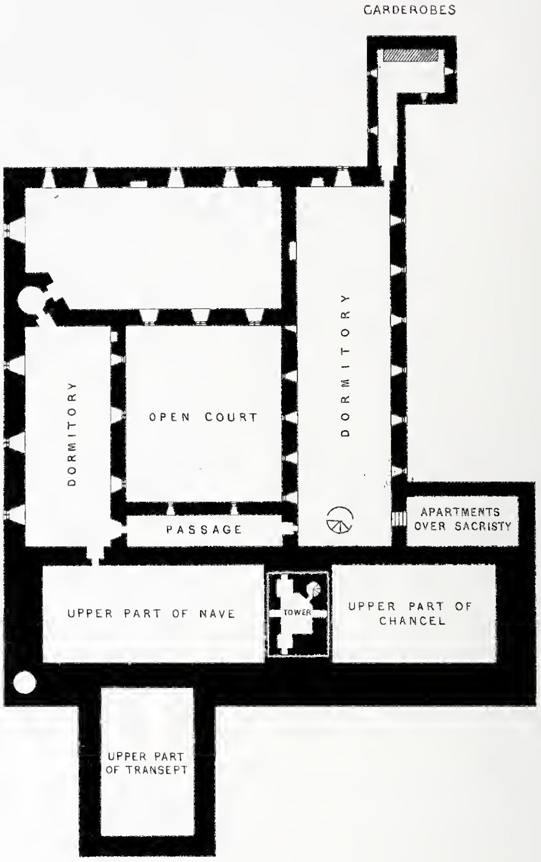
one abbey he had the opportunity of studying—the Abbey of Muckross, near Killarney, which he believed exhibited most of the peculiarities adverted to, more especially the simple character of the intersections of the tracery; and he recollected that the cloister was also tolerably perfect, having a large tree growing in the middle. The cloister appeared to him more like the early Italian. It appeared to him that English architects had not had much to do with the execution of these edifices. The whole subject was one of interest in connection with the care and thought which must have been bestowed upon ecclesiastical architecture in Ireland at that period, and as manifesting the great liberality with which these ecclesiastical edifices were contributed to and supported. The people of the period were clearly a church-loving race, and did their utmost to promote church building, and had left a mass of architectural remains, such as he had scarcely believed to have existed in Ireland. A great many of them were out of the ordinary route of travelling in that country, and they were extremely indebted to Mr. Petit for having taken so much pains to discover these curious and interesting relics. It would, therefore, be their duty to thank that gentleman for his labours in this particular, as all architects had reason to thank him for his labours in other respects. It showed how much might be effected by the simplest means. His drawings were characterised by singular good taste and effect as architectural sketches, and it was gratifying to find a gentleman like himself mingling architectural pursuits with the duties of a clergyman, and it was the more gratifying when they were carried out so successfully as had been done in the present instance. He would now invite such observations on this subject as members might be disposed to offer.

Professor DONALDSON, Fellow, stated that some years ago he had read a paper before the Institute, containing some wayside notes of buildings in Ireland, some of which had been alluded to by Mr. Petit. He had himself, like that gentleman, been struck with the incongruity which seemed to prevail in the Gothic architecture of that country. The Irish people appeared to have preceded those of England in Christianity, but they were certainly behind them in architecture. It was difficult to trace any buildings of earlier date than the thirteenth century, although the jewellery, manuscripts and crosses still existing indicated a taste two or three centuries earlier. The entire absence of the apse might be attributed to the circumstance that they did not present any architectural features of the Norman or pre-Norman period, and their early Gothic might be regarded rather as a debasement of that style, than as indicating any of the refinements which were then so prevalent in England, and also in France. With reference to the absence of foliation in the arches, he thought that arose in a great measure from the impracticable nature of the material employed in these buildings. The black marble and the stone generally used were extremely hard, and on that account probably the architects used only the simplest forms of decoration, as the splay or bevel. Referring to Boyle Abbey, and that of Kilmallock, he thought that they might be regarded as good general types of the Abbeys of Ireland. At Boyle Abbey, the nave seemed to him to indicate an addition subsequent to the period of the original structure, as at the east end there was an arch evidently of a period prior to the nave. The intersecting windows he considered to be part construction. He believed the peculiar features of the battlements of these towers were derived from the original circumstance that they were military towers formed for defence, and that the chambers alluded to, above the chancel and other parts, were for the residence of the armed monks who were the defenders of the buildings—the church being at that period so military as to constitute it literally *the church militant*. Mr. Petit had alluded to the circumstance that the architecture of Ireland had been studied by antiquarians rather than by architects. They must regret that they had not a Sharpe to do for Irish architecture what that gentleman had done for the Abbeys of Yorkshire. If traced to its origin, he believed, they would find a real theoretical progress, showing a system persistently followed up in the arrangement and construction of their buildings. They were all structures of great interest, for the most part beautifully situated, and effective in the treatment of their masses and grouping of the towers. There were also constructive features in the arrangements of the stone tiles and gutters of the roofs, which really reminded one of the arrangements of the Greek temples. This was a subject which might well occupy the attention of Irish architects, and he had himself urged his friend Mr. Deane to endeavour to induce the young men of the profession in Ireland to take up the subject of the architectural antiquities of their country, and he hoped they would be found willing to follow the excellent example which Mr. Petit had afforded in the commmunication with which he had favoured the Institute this evening.

Mr. GORDON HILLS, Associate (responding to the call of the President), said he felt indebted to Mr. Petit for introducing so interesting a subject, illustrated, too, with such beautiful drawings, while from his acquaintance with most of the buildings described he could bear testimony to the accuracy of the delineations. He would mention a few points on which it had occurred to him to offer some remarks, as Mr. Petit proceeded. That gentleman had noticed that the domestic buildings of the monasteries stood sometimes on the north, and sometimes on the south of the churches, apparently without any rule. A rule could, however, be supplied, which was this: if the water supply was from the north, the buildings were on the north side of the church, and if from the south, the buildings were on the south side. The rule was without exception in the Cistertian abbeys which were always situated near a stream, and generally at the confluence of a brook or spring with a more important stream. They required considerable water-power for the working of the industrial establishments attached to them,—mills and machinery of various kinds,—and it would be found in Ireland, as well as in England and elsewhere, that the domestic buildings, in connection with the Cistertian abbeys, always stood between the church and the main stream. This was also very much the case with the abbeys of the other Orders. The water-supply was with them of less importance in an industrial point of view, especially with the Franciscans and Dominicans; still, as a general rule the respective positions of the church and the domestic buildings depended on the direction from which the water-supply was obtained, and the sewage to be discharged. Mr. Petit, in speaking of the church of Dunbrodie Abbey, mentioned that the west-end of the nave and the south side had been completely ruined. When he (Mr. Hills) visited the abbey, ten years ago, those parts were nearly perfect. The west-end had a fine triplet of lancets, of which he preserved a view, as well as a view showing the range of pointed arches which then existed on the south side. In this view it would be seen that the clerestory windows of the eastern part of the nave were more enriched than those westward. This difference showed the extent to which the choir extended into the nave. In Cistertian churches the choir always absorbed a large part of the nave, and some such definition of its extent as he had noticed at Dunbrodie would generally be perceived. This was the meaning of the transverse arches in the nave at Hore Abbey and at Holy Cross, which Mr. Petit had described. He (Mr. Hills) was acquainted only with those two instances of transverse arches introduced in that position, and for that purpose. At the English Cistertian Abbeys of Tintern and Buildwas, remains of stone screens and steps still marked the extent of the nave embraced by the choir. This arrangement of the choir of the Cistertians presented a marked difference from that of the Franciscans and Dominicans to which he would refer again presently. Following the order of Mr. Petit's subjects, he now came to Athassel Abbey, which had been characterised as remarkable, and different from the other abbeys under notice. The fact was, he believed, it was the only house of the Augustine Canons that had been described this evening. In speaking of Killaloe Cathedral, Mr. Petit noticed the small stone-roofed chapel which stands beside it, which he considered to be of the twelfth century, of which date undoubtedly is Cormack's Chapel, at Cashel, a similar but more important building, which we know was consecrated in 1134. By its side also, stands a Cathedral. The Cathedral of Killaloe is of the

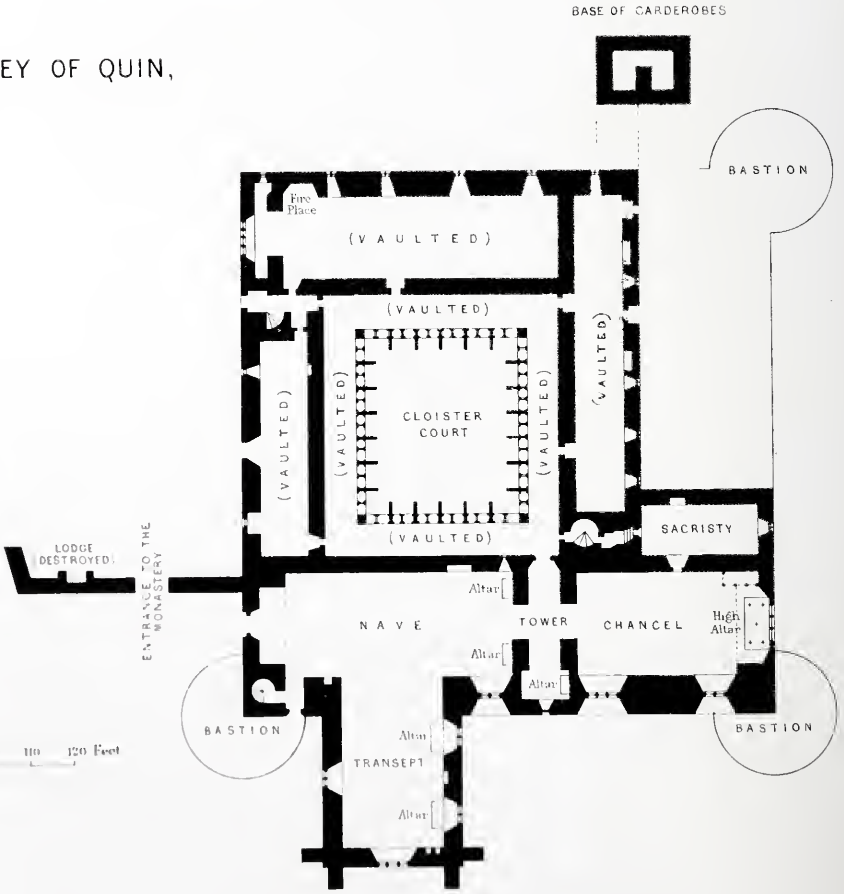


SLIGO ABBEY PART OF CLOISTER.



PLAN OF UPPER FLOOR.

PLANS OF THE FRANCISCAN ABBEY OF QUIN, COUNTY OF CLARE.



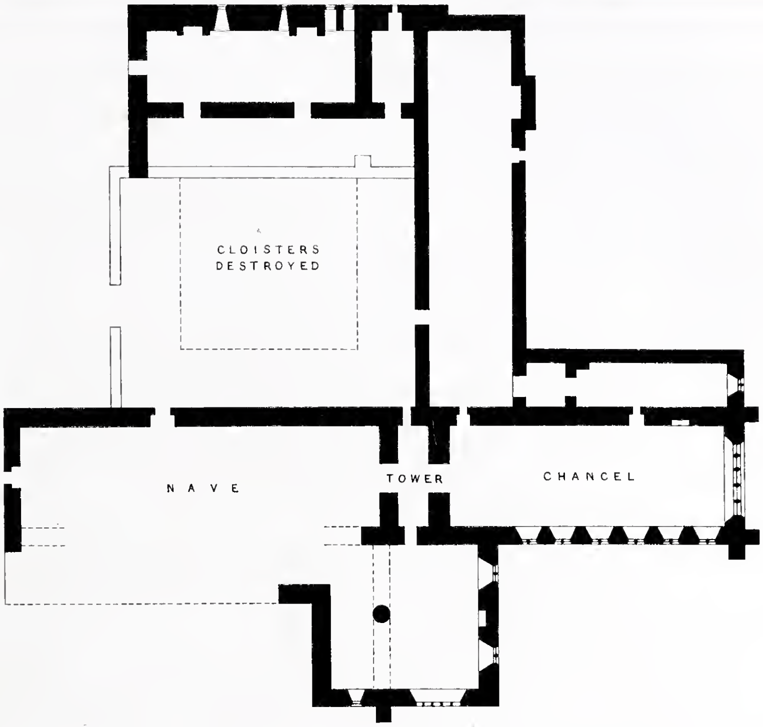
SCALE 40 FEET TO AN INCH

10 20 30 40 50 60 70 80 90 100 110 120 Feet

PLAN OF GROUND FLOOR.

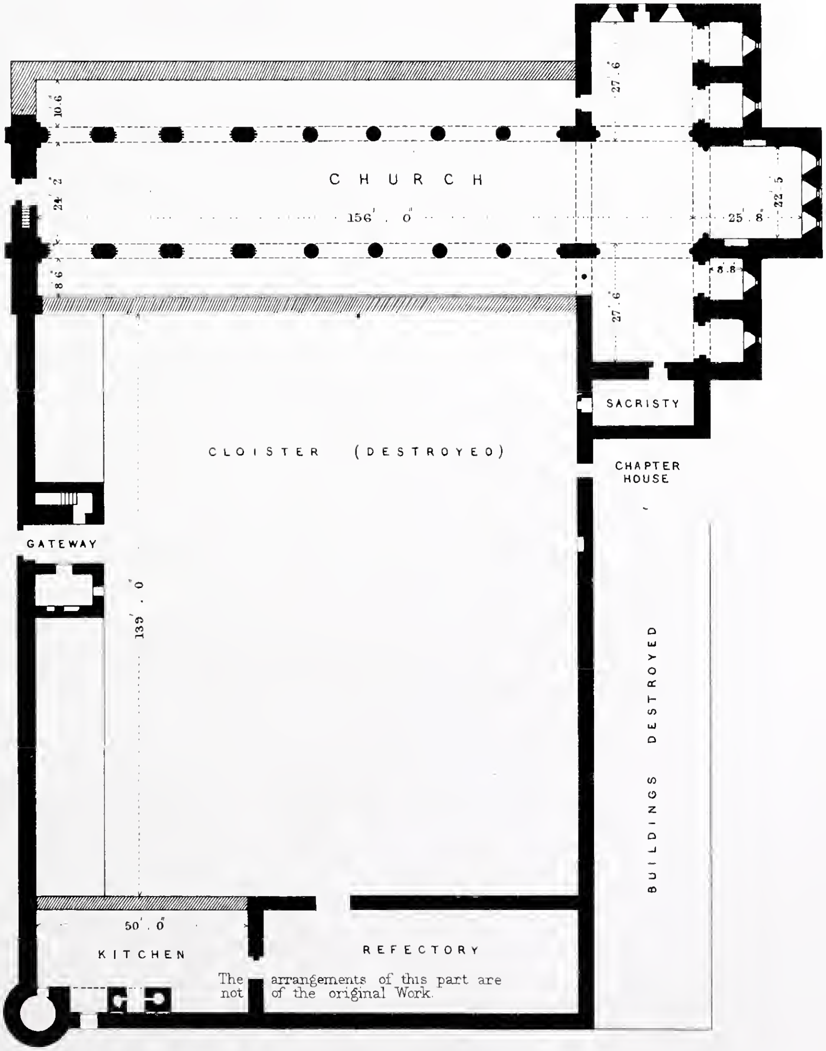
George M Hills Del.

Lithographed for the R I B A by Kell Bros



PLAN OF THE DOMINICAN ABBEY AT KILMALLOCK, COUNTY OF LIMERICK.

SCALE 48 FEET TO AN INCH



PLAN OF THE CISTERCIAN ABBEY OF BOYLE, COUNTY OF ROSCOMMON.

Gordon M Hills, Del.

Lithographed for the R.I.B.A by Kell Bro^s

twelfth century, and that of Cashel of the early part of the thirteenth. The difference of the date of the Cathedral and its associate being so little in each instance, it was remarkable to find the chapels so distinct in the character of their architecture from the Cathedrals. The chapels are of the type of semi-circular arched, or, as it would be called here, Norman architecture, and the Cathedrals are of perfect Pointed work. He thought it was to be accounted for in this way:—The English went to Ireland towards the end of the twelfth century, introducing their own style of building, and thus are found buildings with English characteristics, and those which are purely Irish near to one another. There was another reason why a great change occurred in the style about that period. The Cistertians came to Ireland in the year 1142, and built their first abbey at Mellifont. Their second building was the fine abbey of Boyle—the finest remaining in the country. The Cistertians introduced the Norman style direct from Clairvaux, whence they came to Mellifont, as they used it at that time in England. This Cistertian architecture was very different from anything then going on in Ireland. The Cistertian Abbeys increased rapidly in number, and in themselves constituted a fresh type and style corresponding in influence to the great power and influence of the order. In process of time the freshness of the type wore off, modifications were introduced to suit the peculiar materials at hand, and the habits and genius of the people, so that in later ages again a fresh style peculiar to the country had arisen. Quin Abbey, which appears among Mr. Petit's views, is a building of this remarkable character. It was a late Franciscan foundation, dating from 1433, and is still a nearly perfect abbey, having lost nothing but its roofs, even those humble conveniences, the garderobes, remain entire. It exhibits the peculiar Irish cloister which Mr. Petit has described, the lofty slender tower raised upon the apex of two gables, which cross the church, and which form, at the base, a partition between the nave and chancel, pierced only by a narrow communication between those parts. The walls, which form the external faces of the abbey, are thicker and stronger than those which form the inside faces of its quadrangle, the south walls of the church being from eight to ten feet thick. The abbey was in fact fortified. It was, however, not quite so military originally as it looks now. The circular bastions of which Mr. Petit spoke, and which are shown in his, Mr. Hills' plan, were added in later times, after the suppression of the monastery, according to his recollection in the wars which arose in 1642. His, Mr. Hills' plan (plate No. 13) of this abbey showed it to be perfect still on both floors. One thing which would strike us with regard to the Irish abbeys was their small size, as compared with those in England. He had with him a plan of Buildwas Abbey, in Shropshire, one of the minor Cistercian abbeys of that country, and also a plan of Boyle Abbey, (see plate No. 14), the largest existing in Ireland. The plans show the inferiority of Boyle in point of size. Moyne Abbey, another of the Franciscan buildings had, as Mr. Petit had pointed out, along with its peculiar Irish features, the additional interest arising from the introduction of some of the forms of Italian architecture in its details. It was one of the latest monasteries founded in the century dating from 1460. It had the lofty centre tower, of which he believed they would find no instance earlier than the fifteenth century. Mr. Petit had pointed out that many of those towers were inserted into earlier buildings. At Sligo Abbey the insertion of such a tower was very marked indeed. It was a Dominican abbey, founded in 1252. The original church had a range of eight lancet windows on the south side of the chancel. The tower was built in the fifteenth century, encroaching on the western part of the chancel. The first lancet window at that end was embraced by the tower, and now opens into it on the south side. The next lancet was blocked up by the south-east abutment of the tower, and the range of lancets thereby reduced to six. Another Dominican abbey was that of Kilmallock. It was founded in 1291. Mr. Petit had shown that the lofty central tower was here also an insertion. He Mr. Hills had measured a plan from which the present arrangement of the church would be understood (see plate 14). The chancel belongs to the date of the foundation of the abbey. The difference of the arrangements of the early Cistercian churches, and of the late churches of the Franciscans and Dominicans would now be comprehended. As he had before said, the Cistertian choir absorbed a large part of the nave and left but small accommodation for public resort. The Franciscans and Dominicans shut off the choir for the use of the brotherhood, and provided an extensive nave, a sort of preaching house for the benefit of the people. Historically, the Irish Church towers occupy a very interesting place, striking from their abundance at one period, and their scarcity at others. Before the fifteenth century very few monastic churches had any tower loftier than the low central tower of the Cistertian churches, and a great number appear to have been without towers. Even in the cathedrals, as at Kilkenny and Cashel, the towers were scarcely carried above the roofs. He had examined a great number of the ancient parish churches, and the towers appear to be so rare amongst them, that they may be said to be towerless. An exception, however appears amongst Mr. Petit's drawings, for Gowran Church is not an abbey-church, but an unusually large parochial church, and it has a low tower. It follows that there was a great scarcity of church towers before the fifteenth century, and this idea leads naturally to a consideration of the famous Round Towers which, during such a dearth of others, must have appeared very important buildings. Mr. Petit had spoken of their origin as being enveloped in mystery. Having examined the subject a good deal, and having visited all the round towers in existence, he (Mr. Hills) would say he did not think there was much mystery about it: and, he believed, they might be shown to have been the belfreys of the churches of the earliest periods. They were invariably built near the churches, and always in a way to show their relationship to the churches. He thought that a candid and complete examination of the round towers which remained, and of the churches which stood with them, would inevitably lead to this conclusion.

Mr. Arthur Ashpitel, V.P., said the subject of crypts had been one of great interest, and he begged to inquire whether there was any instance of crypts having been found beneath the Irish churches.

Mr. Gordon Hills replied that, except at Christchurch Cathedral, Dublin, where there is a fine one, he did not know of any instance of a crypt.

Mr. Ashpitel would ask another question, having heard of so many abbeys of Cistercian origin, and of many of the great orders of Friars—the Franciscans and the Dominicans—he would ask how it was they had heard no mention of buildings founded by one of the most influential, the best educated, and the most *rigid* of all the monastic orders, the Benedictine.

Mr. Gordon Hills replied that he believed there were very few Benedictine churches in Ireland. The Cistercians were an offshoot of the Benedictine order, but the Benedictines did not exist in Ireland, as they did in other countries. Elsewhere the Benedictines, having compacted a vast number of independent monastic societies, became in Western Europe the very foundation of monasticism. In Ireland, however, the orders founded by St. Columba, St. Brendan, St. Barry and others, never submitted to Benedictine rule. About the eleventh or twelfth century, the original spirit of these societies had been lost, and the introduction of the Cistercians into Ireland was only one step in a complete revolution of the monastic state there. All the ancient monasteries which survived became Augustinian, or perhaps, most generally, new Augustinian foundations arose, securing the reverence and regard of the people by assuming in some way a descent from the ancient orders. He (Mr. Hills) could remember at the moment only one Irish Benedictine monastery—viz., that of Hore Abbey, at Cashel. This, however, belonged to that order only for a few years, when the Benedictines were expelled and Cistercians substituted. He had already spoken of this abbey in connexion with the Cistercians.

Mr. ASHPITEL said this brought to his mind a remark made by an Irish Roman Catholic priest of eminence, which might throw some light upon a circumstance which struck him very much in looking at Mr. Petit's drawings—namely, that there were considerable indications in them of the influences of south Italian Gothic in the vicinity of Naples. That branching interlaced tracery in some of the windows seemed like that in the cloisters of the large convent at Amalfi. At the time of the controversy, relative to Maynooth College, the priest, to whom he had alluded, said he regretted the movement much, as it was an old tradition amongst all Irishmen, that while the English sent their priests to be educated at Oxford and Cambridge, the Irish send theirs to be educated at Rome; hence they have brought home with them to Ireland Italian learning, studies, and tastes; and now he feared they should have only a second or third-rate Oxford or Cambridge at Maynooth. He (Mr. Ashpitel) was of opinion that this might account for the vestiges of Italian style in many of their buildings. There could, however, he thought, be no doubt, even if not conclusive on these points, that the paper had given some clue to the problem of the marked influence upon its architecture that the education of every nation could exercise.

Mr. GEORGE EDMUND STREET, Fellow, having complimented Mr. Petit upon the excellent collection of sketches he had exhibited, remarked that it always appeared to him in the works he had seen in Ireland, that there had been two distinct sources of inspiration, as had indeed been suggested by Mr. Gordon Hills. After the English invasion of Ireland, under Strongbow, they found numerous churches, which were as distinctly English from beginning to end, as it was possible for them to be: for instance, Kilkenny Cathedral was from first to last an English church, except that the Irish architects of later day had added the parapets, whilst the old English eaves corbel table, which once, no doubt, went all round the building, was still to be seen under the south transept parapet. Mr. Hills had forgotten that the tower of Kilkenny had fallen down, but in its original state no doubt it was as high as most of the other examples, in short this fine church was in every detail a thorough example of a thirteenth century English church. If they went thence to Cashel they found another church, partly built in the thirteenth century and partly in the fourteenth, but throughout distinctly English in style; whilst close to its walls stood St. Cormack's Chapel, which was a famous example of Romanesque work of distinctly national and un-English character. After the invasion the work was no doubt in the main carried on by English architects, much in the same manner as in England, where we see the building of Canterbury begun by a French and afterwards carried on by an English architect. In course of time, no doubt, there, as here, the native architects copied the English work, but they did this with very little variety or originality. A remark had been made upon the very large number of towers that remained in their ruined abbey churches undamaged to the present day. He believed that this was in a great measure due to the admirable arrangement of the gutters. They were all of stone, and were as perfect now as on the day they were built. No lead was used, but the stones forming the bottom of the gutters had a channel cut in the centre of each, discharging the water through a succession of gurgoyles, and then over these other stones were placed over the joint, so fitted that no water had ever got into those towers, though the gabled roofs with which they were covered had, in almost all cases, disappeared. This mode of construction afforded a good lesson to architects of the present day. Again, in these buildings, they sometimes found a very peculiar arrangement of the staircases; which were carried up in the thickness of the walls. As far as his experience of Italian and Irish architecture went, he protested against the theory that there was any Italian influence whatever in the Irish examples. The frequent absence of cusping in the common reticulated tracery was no doubt, as Mr. Donaldson had suggested, owing solely to the difficulty of working the common material into delicate forms of decoration. Mr. Street added, in conclusion, he thought there could be no doubt that it was to the English they were indebted for most of these churches, and that the share due to the Irish school of architecture was very insignificant, whilst, in opposition to what had been said, the English work appeared to him to be of the very best, though of a severely simple description. Indeed, he did not know any class of buildings more deserving of study by English architects, both young and old, inasmuch as they were just the class of small conventual and cathedral churches which they wanted in the colonies, and in the provincial towns of England at the present day, and might well be studied with that view.

Mr. JOHN P. SEDDON (Hon. Sec.), agreed in thinking that the influence of this architecture was certainly not Italian. He thought it might have been considerably modified by influence derived from Wales, which principality in its turn was deeply indebted to England for its architecture. There was a curious analogy between many of the Welsh churches and those in Ireland. Mr. Petit would, doubtless, recollect one in Glamorganshire (Ewenny Abbey), which is in general character very similar to some of the Cistercian abbeys shewn in Mr. Petit's sketches; so, also, is the Priory Church at Brecon, which consists of nave with side aisles, low central tower with turret at one angle rising above it, transepts, each of which originally had two eastern chapels, in order to contain the usual four altars, (these chapels, though now destroyed, have left distinct evidences of their existence,) and, finally, the chancel, which, with its simple long lancets externally, have quite the same appearance of primitive simplicity met with in the Irish buildings, although internally they are developed into fine early English detail. Some time ago he had the pleasure of looking over a vast collection of sketches of ecclesiastical remains in Ireland, by his friend Mr. Freeman, now Hon. Member of the Institute, and on that occasion his attention was particularly drawn to the curious manner of the insertion of the lofty towers that had been referred to. They were evidently, as Mr. Gordon Hills had remarked, of a later date, and he believed generally speaking they formed no portion of the original plans of these churches. He thought they were probably intended to divide the building when the western portion of it was given up for the purpose of preaching in, while the eastern part was still retained for the sole use of the monks. Many of the division arches were so small as to form mere doorways, rather than as if intended to afford means of more complete communication between the two parts of the building. With reference to the simple reticulated tracery, it was constantly met with in Wales, and was frequently to be found in most parts of England.

The PRESIDENT said that the question as to whence the influence which had modified the architecture of these abbeys in Ireland had come, was one they could hardly settle that evening. The discussion had been, however, both interesting and instructive. The cloisters spoken of at Muckross appeared to him to be a bad imitation of very early Italian architecture; but, as he had already said, he had not been able to study the subject very carefully, as his time had been very much occupied with professional business when he was in Ireland, and he had very little leisure to bestow upon the antiquities of that country. He was sure it was the general expression of the meeting to tender their best thanks to Mr. Petit for his instructive communication.

A vote of thanks was passed by acclamation, and the meeting adjourned.

ON THE PHOTOGRAPHS OF THE SCULPTURES OF WELLS CATHEDRAL, ISSUED BY THE ARCHITECTURAL PHOTOGRAPHIC SOCIETY.

By William Lightly, Associate.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, April 20, 1863.

My object in addressing you to-night is to draw your attention to the very interesting and beautiful series of photographs hung on the walls, which, as probably you are aware, have been taken specially for the Architectural Photographic Association. The aim of that Society now being to obtain for its members photographs of subjects interesting to Architects, but which either are not within the reach of the individual photographer, or, though of the greatest value to us, are not of a sufficiently popular character to make it worth the photographer's while to take them on his own account.

In the execution of their design, the Committee selected, as the field for the commencement of their operations, the Cathedral of Wells, of all English cathedrals perhaps the most remarkable for its sculptures, and commissioned Messrs. Cundall and Downes to proceed thither, and take pictures of the whole of the subjects forming the third tier of sculptures of the West Front. Though the sculptures themselves prove to be more perished than was supposed, and, indeed, than they appear when seen from the ground, yet the treatment is generally so noble, the subjects are so interesting and suggestive, and the photographs so beautifully executed, that I think the Association has reason to congratulate itself on this its first attempt on the new system.

The selection of Wells at this time is specially opportune, as the sculptures themselves, I am sorry to say, are very rapidly yielding to the ravages of time and neglect, and I fear also to wanton destruction.

By those engaged in the practice of architecture, more especially of Pointed architecture, the value of figure sculpture, as the most noble means of adorning their buildings, is becoming daily more felt and acknowledged; and I am rejoiced to see that in some beautiful churches, and other buildings recently erected by members of this Institute, most praiseworthy efforts have been made in this direction.

Thanks to the encouragement given to architectural sculptors, both by the more general use by architects of carved ornamentation, and also by the prizes offered to workmen by the Committees of the Architectural Museum, and other societies, and by several earnest and liberal gentlemen, the carving of architectural decorations has steadily and rapidly improved, and we now have a school of men who have shown themselves quite capable of doing better and greater things, if only their efforts are rightly directed.

We cannot expect them to do perfect works at first, but they will improve in this as they have done in the more easy branches of their art; and it behoves us architects neither to be idle ourselves, nor to allow them to stand still. We must ourselves study diligently and patiently the old works, and thus qualify ourselves to teach and direct those who have to execute our designs.

For this purpose I would venture to observe, that the series of photographs before us is a most valuable Study Book, enabling us, as it does, to examine minutely, and at our ease, one of the most interesting series of sculptures that the thirteenth century produced. I do not say they are perfect, or equally good, for some of them, no doubt, to modern eyes, will appear rude, grotesque and wanting in refinement; but we must remember that we have to learn what to avoid as well as what to follow: and I think that when any of us has produced a series, exhibiting as much orginality and vigour of design, with equal spirit and beauty of execution, he will indeed have good reason to be proud of his achievement.

The Architectural Photographic Association merits more general support from the members of the profession for having thus, at great expense, provided the means of studying at our convenience, in our own homes, perhaps the most perfect and interesting example of decorative sculpture that we possess. I hope they will take the hint, and encourage the Committee to make further efforts.

Jocelyn Trotman, an Anglo-Saxon, was elected to the Bishoprick of Wells in the year 1206. In 1208 he was banished for having sided with Pope Innocent XIII., in a dispute which had arisen between that Pontiff and King John, and remained in France till 1214, when he returned to his See with enlarged experience and accumulated funds, and commenced in the following year the re-building of the whole of the Cathedral, west of the Presbytery, including the west front, with the whole of its glorious sculptures. He died in 1242.

If you will look at this General View of the West Front, you will see that the whole is divided horizontally into nine tiers or zones of sculpture. These zones are again divided vertically into two parts, all that refers to the spiritual character (de vetere lege) being placed to the south of the west door; and all referring to the temporal character (de nova lege) to the north of it. In this West Front, and the Return Ends, north and south, there were upwards of six hundred figures, varying in height from 2 to 8 feet; a number about equal to that of the figures in the pediments, metopes and friezes round the cella of the Parthenon.

First Tier.—The niches of the first, or ground tier, originally contained sixty-two figures, all of which have disappeared.

Second Tier.—Consisted of thirty-two quatrefoils, containing angels issuing from clouds, several of which still exist, and are very spirited.

Third Tier.—Comprised seventeen quatrefoils to the south of the west door, filled with subjects from the Old Testament, and to the north of the west door and on return end, thirty-one, from the New Testament; thirty-five of these forty-eight still contain the subjects or remains of them, the whole of which are illustrated by the Photographs before you, arranged in the order in which they occur. The figures are about two feet in height.

Fourth and Fifth Tiers.—Displayed in 126 niches, the effigies of those Lords Spiritual and Temporal, under whom the blessings of Religion, Learning, and Good Government, have been cherished and defended in this country.

Sixth Tier.—Shewed forth the Resurrection in ninety-two subjects, containing 150 statues about four feet high.

Seventh Tier.—In the fifteen niches the Hierarchy of Heaven is represented by Angels.

The Eighth Tier is occupied by the Twelve Apostles, eight feet high.

Ninth Tier.—The whole culminating in the three niches of the ninth tier, in the centre of which our Lord was represented sitting in judgment, the side ones being occupied by the Virgin Mary and St. John the Baptist.

I will now conclude by briefly noticing each subject:—

1. The first quatrefoil is now unfortunately empty.
2. The Almighty creates Adam, and
3. Draws forth Eve from his side while he lies sleeping—both majestically treated.

4. God places our first parents in the Garden of Eden.
5. Adam and Eve, standing side by side, are yielding to the Tempter, who is represented as a serpent, his body coiled round the tree, while his head (the head of a serpent, not of a human being, as it was often represented) hovers above with an apple in the mouth, for which Eve reached up her hand behind. Adam is eating the forbidden fruit.
6. This subject appears to be the Almighty in the Garden, dictating the laws from a book in his hand.
7. Is empty.
8. Adam and Eve labouring, Adam, apart from Eve and with his back turned to her, delves, while Eve spins—very fine.
9. This subject is supposed by Professor Cockerell to be the Sacrifice of Cain and Abel; but I would venture to suggest that it is intended to represent Abraham about to sacrifice his son Isaac, who is represented by a small figure bound on a bundle of wood. A figure much mutilated appears to arrest Abraham as he is about to strike.
10. Is empty.
11. The Almighty in wrath decrees the Deluge.
12. Noah building the Ark.
13. The Ark with its occupants—the Flood below.
14. Contained the Sacrifice on Ararat, much mutilated, but the figure very fine.
15. Two Figures, supposed to be Isaac and Rebecca.
16. Isaac's Blessing.
17. Jacob Blesses the Patriarchs.
18. Empty.

New Testament Series :—

1. St. John Evangelist, with the Book of the Apocalypse, supported on Back of Eagle. St. John represented as an Angel.

2 & 3. Empty.

4. Our Lord arguing with the Doctors. The treatment is remarkable. The youthful Christ being placed on a pedestal—near him are Joseph and Mary.
5. St. John Baptist in the Wilderness, an angel appears to him in the clouds.
6. Probably the Mission of the Apostles.
7. Empty.
8. This single Figure probably represents our Lord in the Wilderness.

9 & 10. Appear to represent respectively The Feeding of the Five Thousand and Four Thousand.

11. The Transfiguration.*
12. The Triumphal Entry into Jerusalem. The gate is pointed; spectators look from the walls, while one strews his clothes and palm branches in the gate.
13. Judas betraying our Lord for the thirty pieces of silver.
14. The Last Supper. St. John reposes on the bosom of his Lord; in the front the Virgin Mary receives the Communion from the hands of Christ—an explanation for which I am indebted to a very able notice of these photographs in the "Beffroi," a Fine Art journal published at Bruges, by the hand of Mr. Weale.

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* Here also I have ventured to depart from Professor Cockerell's description.

15. Empty.
16. Our Lord before Pilate or Caiaphas.
17. The Saviour bearing the Cross, much mutilated.
18. Much mutilated, but appears to be The Raising of the Cross.
19. The Deposition.
20. Empty.
21. Our Lord rising from the Tomb; on either hand an angel. Three soldiers asleep below.
22. The Gift of Tongues.

The general idea of this series of Sculptures Bishop Trotman probably borrowed from some of the French cathedrals with which he had become acquainted during his banishment, as there were several series executed about that time in France. At Amiens, for instance, there is a series, consisting of six subjects from the Old Testament and sixteen from the New. In the Portal of S. Anna, Notre Dame de Paris, there are (says Mons. Gilbert) twelve bas reliefs of the New Testament subjects, but none from the Old. At Rheims, again, the first stone of which was laid in 1812, there are eighteen subjects from the Old Testament. At Strasburgh, thirty-four subjects from the Old and twelve from the New Testament.

Thanks were passed to Mr. Lightly by acclamation, on the motion of the Chairman, Mr. Owen Jones, V.P., for the interesting communication he had read, and to the Architectural Photographic Association, for the steps they had taken for preserving such admirable records of works of so great an interest to the profession.

You can
go on with
Mr Willis paper
JPS

23 York Terrace N.W.
Regents Park

July 18. 1863

My dear Sir

I send you a line to day that I have no occasion to see any more proofs of my paper, which, as far as I am concerned, is completed. & may be published as soon as you please.

Yrs truly
R Willis

J. P. Seddon Esqre

THE CRYPT AND CHAPTER HOUSE OF WORCESTER CATHEDRAL.

By the Rev. R. Willis, M.A., F.R.S., &c., Hon. Member, Jacksonian Professor of the University of Cambridge, President of the British Association for the Advancement of Science, &c. &c.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, April 20, 1863.

The Crypt and Chapter House of Worcester Cathedral are so well known to architects and archæologists, that I must commence by explaining my reasons for selecting them as a subject for the present communication. The cathedral and its dependant buildings had been for some time in a gradual decaying and dangerous state, occasioned by the crumbling nature of its materials, original settlements arising from its piecemeal construction, and unequal foundations, and the injudicious half-measures of patching repairs employed in the last two centuries to sustain it. In 1857 a complete and thorough repair and restoration was undertaken, and has been most admirably and skilfully carried out by Mr. Perkins, the cathedral architect, who, with great constructive skill has succeeded in removing the subsidiary props, buttresses, and other encumbrances which had so long disfigured this remarkable monument of Mediæval art.

The visit of the Archæological Institute to Worcester in the past year happened most opportunely at a time when the scaffolding was standing, and the greater part of the buildings in possession of workmen and covered with dust; so that not only freedom of access to every part was easy by means of the ladders, but the walls could be scraped and examined without the fear of disfigurement or damage, which prevents such research when a cathedral is in complete order. You may imagine how eagerly I availed myself of the unusual opportunities thus afforded me to investigate the construction of the buildings. The kind permission and cordial sanction of the authorities enabled me to scrape and dig wherever I wished, and Mr. Perkins most obligingly directed his workmen to perform these operations wherever I thought them necessary.

As the results which I thus obtained possess considerable novelty, I venture to hope that they may be thought worthy to be recorded in the Transactions of the Institute I have now the honour of addressing. I may add that the architectural history of the cathedral formed the subject of an address which I delivered to the Archæological Institute. The crypt and chapter house I examined in the week after the meeting was concluded, and it is to these subsequent researches, which I have not communicated to the latter Society, that I have to direct your attention upon the present occasion.

THE CRYPT.

In England there remain to us four great apsidal crypts, all Norman. Winchester, founded in 1079; Worcester, in 1084; Gloucester, in 1089: and Canterbury, in 1096, each of which is distinguished by some architectural peculiarity. In all of them the plan is necessarily conformed to the superstructure of the Norman church above, and when that has been destroyed to make room for more extensive buildings, the Norman crypt will generally enable us to restore the original plan of the superstructure. In the four crypts above mentioned, the central apsidal portion included within the strong walls that serve to carry the piers of the upper work, has an outer aisle which runs completely round the apse, and this aisle communicates with chapels beyond, in accordance with those of the upper building, the arrangement of which chapels vary in the several examples, but do not form any part in the investigation I am now concerned with, which relates principally to the distribution and structure of the crypt vaults. These are always sustained by intermediate pillars in the wide central part, and in the case of Worcester, also by one row in the side aisle. In the central part, the crypt of Winchester has one row of such intermediate pillars, at Gloucester and Canterbury are two rows, and at Worcester three rows, yet the total width of this central part is in the latter but 30 feet, whereas at Winchester, Gloucester and Canterbury the widths are 34, 32, and 36 feet respectively.

The crypt of Worcester, from this multiplicity of pillars and the consequent comparatively small span of the arches, acquires a unique and highly picturesque character, enhanced by some peculiar arrangements which I will proceed to describe.

In the crypt of Gloucester, and in all the apsidal crypts of the Continent that I am acquainted with, the rows of pillars, arches, and vaults are continued in the same line into the apse, and abut against its curvilinear wall, without any attempt at accordance with its form.

At Winchester and Worcester, on the contrary, where there is a central row of pillars, the eastern pillar of the row (W. Fig 1) is placed in the middle of the apse, and the central series of arches branch off at this pillar in as many directions as the plan requires, dividing the apse into three triangular or fan-shaped compartments at Winchester, and into five such triangles at Worcester. Thus, the idea of a central pillar whence arches and vaults radiate to a circular or polygonal wall appears (as far as existing examples are concerned) in England, and first in the crypt at Winchester, five years afterwards at Worcester, and is wholly unknown on the Continent. At Winchester, however, this arrangement arises naturally from the distribution of the arches of passage between the central crypt and its outer aisle; for one of these is in the central line at the east end of the apse, so as to make it impossible to continue the range of central arches up to the apse wall. Instead of one arch, therefore, there are two which diverge from the last pillar to responds on each side of the arch of passage.* The effect of these radiating arches is greatly diminished by having this pillar placed between four or five feet to the east of the centre of the apse. But at Worcester, the radiating arches with their branch-like grouping, are developed into a most picturesque and beautiful architectural composition, for the lateral ranges of pillars and arches terminate eastward in a semicircular arcade, (X. Y. Fig. 1) concentric with the central pillar which is the end of the middle range, and the radiating arches from this central pillar rest on the pillars of the semicircle, whence other arches continue the radiating system to the outer wall. This is shown in my plan of the apsidal portion of the central crypt (Fig. 1).† The western part of this is vaulted in seven series of four square compartments each, of which my plan shows only the eastern series (a. b. c. d.). In these square compartments the centres of the pillars are 7 feet apart, but the centre of the central pillar (W.) of the apse is but 4½ feet from the last pillar (V.) of those which belong to the square compartments, and consequently the last arch (V. W.) of the middle row is narrower than those to the west of it.

A similar introduction of a narrower arch is employed at Winchester, but there the centre of the apsidal wall is half way between these two approximated pillars, instead of coinciding with the pillar whence the branching ribs arise. In truth, the point on the abacus of the central pillar at Worcester, from which the arches radiate, does not exactly coincide with the centre of the abacus for a curious reason which I must explain; but is so near to it as not to interfere with the effect.

This abacus sustains seven radiating arches, of which six spring off to the east of their centre, and but one to the west. On the plan (Fig. 5) the middle lines of these arches will be seen to diverge from a point or points of the abacus four or five inches to the west of its centre, and consequently of the axis of the pillar, thus leaving more space on the abacus eastward, to receive the greater number of arches and groins which spring in that direction, each of which was required to rise from the abacus separately and distinctly. This is a curious example of a primitive arrangement to meet a difficulty. Comparing the two crypts of Winchester and Worcester it is clear that their radiating ribs are arranged in so similar a manner, as to shew that the one was suggested by the other; yet the characters of the two, considered as architectural compositions, are totally different. The form of the arches of the first, whose span is 15 feet, and height 6 feet, is an ellipse. Of the second the form is a stilted semicircle, only 6 feet 2 inches in span, and 3 feet 7 inches in height. The entire pier of the first is 2 diameters high, the shaft being 1⅓ diameters in height, and its actual diameter 2 feet 6 inches. The entire pier of the second is 7½ diameters high, its shaft being more than 4 diameters high, and the actual diameter 10½ inches. The one is a plain massive sepulchral chamber, the other a graceful, complex and beautiful temple. This is due to the use of three ranges of pillars for the support of the vault instead of the single range, which by multiplying the supports enables a lighter style to be employed. He who designed the crypt of Worcester had manifestly seen that of Winchester, but in originality and taste was of a greatly superior order to the architect of the latter. To appreciate his work it must be seen when illuminated by a number of candles, which was the case during the meeting of the Association.

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* At Canterbury, where two ranges of arches are employed in the crypt, a similar pair of diverging arches at the east end of each range is used to accommodate the arches of passage in the apse, evidently copied from Winchester. But as Canterbury crypt is later than Worcester crypt it is unnecessary to occupy our attention with it on the present occasion.

† Plans of the entire crypt are given on a small scale by Wild and Britton, and in my Architectural History of the Cathedral (*Archæological Journal*, No. 77). In Britton's Winchester the crypt is well illustrated by engravings.

One of the sources of picturesque effect in this crypt is the variety of form of the arches and groins* in the apsidal part. The arches that radiate from the central pillar are 5 feet 2 inches in span, and 3 feet 8 inches in height from the abacus level to the soffit. They are semicircular, and therefore, as these dimensions show, the centre of the semicircle is stilted 1 foot 1 inch above the abacus. The arches in the semicircular arcade have half the span of the radiating arches,† and the same altitude very nearly. They, therefore, are stilted more than 2 feet above the abacus.

Fig. 7 is a perspective sketch of the groined vault that covers one of these fan-shaped or triangular compartments. It shows the ogee arch-like form of the groins which are produced by the intersection of the two larger semi-cylindrical vaults with the narrow high-stilted semi-cylindrical vault. This ogee or inflected groin, as I pointed out long since,‡ results naturally from the geometrical intersection of two semi-cylindrical vaults of equal height and unequal span and stilting, but is developed more clearly than usual in this crypt on account of the narrowness of the small arches. The intricacy of effect is enhanced by the convergence of the wider arches to the single central pillar. From their vaults it results that a single groin line is produced which extends from the apex of the ogee groin downwards to the abacus of the central pillar. The surface of the vault is covered with a thick layer of hard mortar, and the edges of the groins are in a small degree formed with this in such a manner as to project from the vault surfaces with an acute section which gives greater decision to the groin line, and also exaggerates the apex of the ogee arch. It is evident that the form of this curve was pleasing to the Norman artist, and although resulting naturally from the intersections of the boarded centerings employed to construct his vaults, and not from geometrical knowledge of the science of projection, was appreciated and developed as an element of variety and beauty. The inflected groin is to be observed in every Norman, and indeed Roman vault, when the length and breadth of the vaulted compartment are unequal, and the acute edge of the plaster groin is also employed in other Norman examples; but when the difference of length and breadth in these is small, the inflection is so slight as to become a deformity instead of a beauty.

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* It may be well to remind my readers that throughout this paper I use the word *groin* in its strict sense of the *line* in which the surfaces of vaults meet each other, when the angle at which they meet is external, forming an *edge*. If it be internal, forming a *nook*, this meeting line is a *ridge*.

† The central arch of the semicircular arcade is 2 feet 9 inches in span, and the others 2 feet 3 inches only.

‡ Remarks on the Architecture of the Middle Ages, especially of Italy, 1835, p. 73. In Winchester crypt the fan-shaped compartments are so nearly equilateral triangles, that the above source of variety is not developed.

My plan (Fig. 1) shews that the inner faces (as S T U) of the great piers of the semicircular wall, do not follow the circular form of the apse, but are disposed as if belonging to a regular polygon (*e f g h*, &c.). Above the impost line, the wall and arches (as S T) which rest on these piers, are curved to the apse, as shewn in the lower half of the plan (at H P K). The small arches (as M) are carried straight across from pillar to pillar of the semicircle.

In this plan I have carefully projected the seats of the groins. The curves obtained correspond as nearly as possible with the actual form of these lines, observed and sketched by me in the crypt. The inflections of these lines are often neglected in plans, where the groins are merely indicated by straight lines ruled from the angles to the centre. But they appear to me to deserve very careful study.

In the triangular compartments (as B C D), the vaulting surfaces proceeding from the three bounding arches (K, L, M), and as nearly as possible perpendicularly to the respective faces of these arches, intersect in three groins (A B, A C, A D).

The compartments of the vaults in the outer semicircle of the apse, next to the inclosing wall of the crypt, are in the form of a symmetrical trapezium (E F H K), having three equal sides, and one shorter side. The vaults proceeding from these arches intersect in four groins (G E, G F, G H, G K), the real plan of which agrees with the geometrically projected plan, and is shown in (Fig. 1). The slightly ogeed groin (E G F), is produced by the intersection of the narrow high stilted vault, (E F G) with the two wider ones (E H G, F K G) that flank it. The intersection of the three equal vaults (E H G, F K G, H G K), of which the two lateral ones spring from arches (N, O), whose respective faces are not parallel, produce groins (G H, G K), slightly convex towards the middle arch (P).

It is worth while to examine the nature of the groin (B A), more in detail. In (Fig. 1) the triangular compartment (B C D), is bounded by two equal arches (B C, B D), and one lesser arch (C D). The vault surface (B A C) is perpendicular to the vertical face of the arch (K), and similarly the surface (B A D), to the arch (L). The meeting of these two surfaces produces a groin (B A). * If formed with geometrical accuracy, the angle of its edge, where it rests on the abacus, would be equal to the angle of *k b m* (150°) in the abacus plan of the central pillar (fig. 5), where *k b*, *b m* are respectively perpendicular to the faces of the arches. This angle, which diminishes as the groin rises from the abacus, and vanishes entirely at the soffit, gives too shallow a projection to enable the groin line to be seen with sufficient effect.

It is in this place that the expedient above mentioned of giving an acute edge to the groin by means of its plaster coating is employed with its greatest effect. The abacus plan (fig. 5), shows the manner in which this acute groin is brought down between each pair of adjacent soffits, and with a projection equal to their's.

The same system is pursued in the vault of the chapter house, where the radial groins, geometrically so obtuse as to be practically feeble, are brought into prominence by the same artifice, as shewn in Fig. 6. But the groins of this vault have been tampered with in the upper parts, in course of the great repair in the fifteenth century, as will appear below. After the invention of rib-vaulting, the groin (B A) became a rib, as may be seen in all the polygonal chapter houses. In the Note (A) at the end of this paper I have given some geometrical details of the forms of the vaults and groins, and will now explain the actual construction of the vaults of this crypt.

In the three Norman crypts, which I have compared with Worcester, the arch ribs are built of masonry, with regular voussoirs, and the intermediate vaults of rough light material, plastered. But at Worcester the transverse ribs are wholly formed of a hard mortar, out of which, also, the surface of the vaults and the form of the groins, are moulded. The nucleus or core to which this fictile* architecture is applied, is formed of a hard ragstone, which occurs of an average thickness of two inches, and is employed in pieces of about a foot in breadth, and of irregular form, roughly shaped with an axe, and laid with mortar beds fully an inch thick. Fig 2, which shows three pillars and arches, exhibits, first—a section through the centre of a pillar and vault; next—a section through the crown of the vault, giving in elevation the nucleus denuded of plaster, and, lastly, the finished vault. Fig. 3 is a perspective sketch of the nucleus, as it would appear if the vault were taken down to the line *a b*.

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* If the three arches (B C, B D, C D), were of equal span, the groin lines (A B, A C, A D), in the plan would be straight, and meet in the centre of the triangle, as they do in the corresponding part of Winchester Crypt.

This is not a fancy sketch supplied by a superficial examination of the crypt vault, where it happens to have the plaster knocked off, for I was fortunate enough to discover a portion of ruined vault belonging to the south-eastern portion of the outer aisle of the crypt, which has been walled up immemorially. But, at the time of our visit, it happened that the removal of the floor and pews in the choir above the eastern circular aisle of the crypt, had disclosed a deep ruinous cavity in the pavement, a little to the west of the great south-western pier of the eastern transept, produced by the failure of the crypt vault at that place, and probably occasioned by some forgotten attempt to construct a sepulchral vault in that position. This discovery explained the fact that this pew had always been the coldest and most uncomfortable in the cathedral, on account of the currents of air which inexplicably arose from the floor. I availed myself of the opportunity thus afforded, to clear away the rubbish, and examine the fractured structure of the portion of crypt vault exposed, which thus enabled me to determine the exact internal construction of these vaults.

The upper surface of the two courses, exposed in (Fig 3), are exact portraits of those which I uncovered. The pillar is the one which receives the arch that springs from the respond (R), in (Fig. 1). Fig. 4 is a horizontal section of the vault immediately above the abacus. But the surface of the nucleus can be examined in several places of the crypt, especially in the north aisle, where the open windows, the aspect, and the fact of the ground outside having been employed as a cemetery, has produced damp and decay, and the mortar has, consequently, in many places fallen off, and has, moreover, been knocked off by piling and storing old materials, ladders, benches, and workmen's tools in the crypt, especially at the west end of this north aisle.

The nucleus rises from the abacus of the pillar very nearly in the simple form of a square, set diagonally, with rounded angles. Three or four of its lower courses are laid horizontally; but, as the next courses rise they assume the arch form, and, consequently, take the shape of a truncated pyramid, the slope of whose sides to the horizon increases with each succeeding course. In the horizontal lower courses a rough corner of the ragstone is placed here and there to guide the plasterers in forming the groins, but in the pyramidal courses they are carefully shaped. The ragstones at the angles lap over, to the right and left alternately, as the courses rise, so as to form a bond. In the middle of each face of the nucleus the ragstone is chopped, so as to present a rough projection, to serve as a key to the mortar, which forms the transverse arch. This shows plainly that the transverse arches were intended from the beginning. Without these projections we might have suspected that the vault was intended to be made wholly without the transverse arches, as in the Norman passage, between the south transept and chapter house.

In the responds the groin edges commence in the nucleus from the abacus. The section (Fig. 2) shows that the voussoirs of the haunches of the vaults are a foot or more in depth, but that at the crown this depth is diminished to six or seven inches only, above which rubbish is laid to make a bed for the pavement above, the level of which has been changed from time to time.

The vaults beneath the refectory are Norman, of the same kind, of rough construction, but of simpler form. The pillars are short cylindrical ones, with circular abacus, and the ragstone vaulting

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* "Fictile (*fictilis.* Latin), moulded into form; manufactured by the potter." (*Johnson's Dictionary*). Since the above was written, I have been informed by Mr. Seddon, who kindly examined the vaults of the Canterbury crypt at my request, that they are built in the same manner as those of Worcester.

begins from the abacus in an octagonal form, the edges of the octagon, which are turned to the cardinal and intermediate points, form groins which cross over transversely and diagonally to the adjacent piers and responds. In this case there are no square-edged ribs. The vault is of the form of a segmental arch.

The present entrance to the crypt from the south transept is not the original one. The ancient entrances, placed as at Gloucester and Canterbury, at the western extremities of the crypt aisles, are now walled up, and as usual, there must have been placed in each transept under the arch which opens from it to the side aisle of the presbytery, two flights of steps side by side, the one ascending to the floor of the presbytery, the other descending to the crypt. The present entrance was first formed in 1556, as I have shown in my forthcoming History of the Cathedral.

THE CHAPTER HOUSE.

The Chapter House is circular, 56 feet in diameter within, vaulted in ten compartments, with a central pillar, and as a Norman building was erected complete in the first half of the twelfth century. It received a thorough repair about the year 1400, by which its external appearance was transformed into an early Perpendicular decagon, with deep thin buttresses at the angles, surmounted by pinnacles; rich tracery windows complete the exterior, which retains no trace of its Norman origin. In the interior, on the contrary, the circular Norman wall, with its rich niches and interlaced arcades, remain intact, as also the central pillar and vaulting arches; the only evidences of the change—so complete without—are the windows, the pointed vault cells above them, and the door of entrance.

This Chapter House is the earliest remaining of the English group, vaulted by branching ribs from a central pillar, of which no continental example is known. I have just endeavoured to show that this system of vaulting originated in the English crypts; but as the Chapter House of this cathedral is several years in advance of the crypt, I am not prepared to assert that other chapter houses in England with branching pillars, now destroyed, may not have preceded it. There are but five or six now left to us,—two of which are in ruins,—which, in order of style, are Worcester, Margam Abbey,[*] Lincoln, Lichfield, Salisbury, Westminster (1250), Hereford, Wells, and York.[†] I pass over the square chapter houses with central pillars which are found in Scotland, because their vaults really consist only of four squares of ordinary rib-vaulting.

It is worth remarking how early the English character for sound mechanical sense and aptitude for new and ingenious constructions began to influence the forms and arrangements introduced from Normandy. This originality especially shows itself in vaulting. I have often had the pleasure of pointing out the superiority of our masons in that department, and the new methods introduced by them. In the Transactions of the Institute[‡] I have now the honour of addressing are contained some

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[*] I am indebted to Mr. Seddon for my knowledge of this example, which is in Glamorganshire, but in ruins.

[†] LIST OF ENGLISH CHAPTER HOUSES WITH CENTRAL PILLAR:—

	Form.	Interior diameter. feet.	
Worcester	Circular, ten compartments	56	Norman.
Margam	Circular, twelve compartments	50	Early English.
Lichfield	Octagon	47 by 28	——— ———
Lincoln	Decagon, with late vault	62	——— ———
Salisbury	Octagon	58	Early Decorated.
Westminster	Octagon (1250)	62	——— ———
Hereford	Decagon	40	Early English below, Perpendicular above.
Wells..............	Octagon (c. 1298)	59	Decorated.
York	Decagon (c. 1320)	60	——— ———

The interior diameter measured from angle to angle.

[‡] Vol. i., Part 2, p. 1, 1842. The Norman rectangular room at Newcastle, vaulted with a central pillar, and described in this paper (page 5), is of the same class as the chapter houses. Its triangular compartments are covered by a concave vault, without groins. The Norman "Baptistery" at Canterbury may be also quoted.

of my earliest investigations on this subject, and I am most happy to be able in this place to add new proofs of English skill in the examples at Worcester of the vaults of the crypt and chapter house.

The original exterior aspect of this chapter house may be to a certain extent ascertained from portions still visible on the north side (which I have delineated from careful measurements in Fig. 12). Between the chapter house and the south gable of the cathedral transept, the space is occupied by an original vaulted Norman passage. Above this, in 1377, a high building was constructed, for the purpose of a treasury, which extended eastward beyond the passage, and covered with its various apartments three compartments (9, 10, 1, 2. Fig. 8) of the exterior of the chapter house, before the Perpendicular changes of 1400, thus protecting its wall from entire alteration. On the ground the north part of the chapter house was masked from the beginning by the original Norman passage K.* The Norman buttress No. 2 remains, with the exception of its eastern set-off; and buttress No. 10 is complete. Mr. Perkins, at my request, excavated in search of the original plinth, but found none, probably because from the beginning, as now, these two buttresses were placed within chambers that concealed the exterior of the building. On the first floor (Plan, Fig. 9) the compartment (1, 2) of the Norman wall appears at V. in the small passage which leads to the garderobe, and the buttress (10), with part of the adjacent wall, in the second chamber of the treasury. In both these cases the buttress was pared away and reduced when the treasury was built, as the plan shows, and the surfaces of the intermediate wall scraped and repaired. The upper chamber of the treasury (Plan, Fig. 10) retains the Norman wall, at H., which has been less tampered with. Fig. 12 shows in elevation the portions of compartment (1, 2) that are visible on these different floors. From these we ascertain that the buttress has a plain face C, D, E, flanked by an angular set-off F, H; from this angular set-off an arch springs, at a height of 18 feet from the present floor of the passage. The upward termination of the outer face of the buttress and the original parapet are lost by the repairs and insertion of the treasury vault at the upper part of the wall. We may suppose it to have been somewhat in the manner shown by the dotted lines at G. A Norman window is placed beneath the arch at A B; this window is walled up, so as to leave the mouldings of the head exposed, as the section (Fig. 12 *a*) shows; but in the room below the surface of the wall has been pared away, and the window filled up to the same level, as shown at *a b*, but yet leaving the trace of the moulding of the window jamb, and thus indicating the place of the sill. The great arches are also retained in the opposite chamber of the treasury at buttress 10, but the window is totally covered, as the plan (Fig, 9) shows.

The interior wall is divided by the Norman respond shafts into ten compartments or severeys. In arrangement and ornamentation, the lower part of the severeys has a singular resemblance to that of the chapter house at Bristol. The latter, however, is a rectangular room. In both a bench table runs round the wall; upon this rests a range of shallow niches, by which the wall is spaced out into distinct stalls; over these is a string course, upon which reposes an arcade of intersecting circular arches, resting on pillars. The wall above, at Bristol, is terminated by a semicircle, not pierced by a window, the chapter house being lighted from the end only. The vault cells rest upon the semicircular blank wall, which is covered with diaper-work of zig-zags, &c. At Worcester the wall above the intersecting arcade has been rebuilt, with Perpendicular windows; but the external arch and window, already described, show that in all probability the wall, as at Bristol, was originally terminated internally by a semicircle, upon which the vault cell rested, as shown in the Section (Fig. 11) and Elevation (Fig. 13). In both examples the respond shafts that carry the vault ribs, rest without bases, upon the string course which surmounts the range of niches, so that the range is uninterrupted. The style of Bristol chapter house is of later Norman than that of Worcester, and, being plainly copied from it, probably has preserved to us the upper termination and form of the vault cells of its walls, but need no longer occupy our attention. The intersecting arcade of these two chapter houses is in arrangement the same as that employed as a belt of decoration on the outside of Ernulf's work at Canterbury, the wall, in fact, of the great crypt already compared with that of Worcester, and only twelve years later. An arcade, very nearly the same, ornaments the interior wall of the east end of the chapter house at Rochester, which is the recorded work of this Ernulf, after he became Bishop of Rochester in 1114[*].

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* For the facility of reference, I have in the plans distinguished the ribs of the chapter house by numbers from 1 to 10 which apply equally to the buttresses respectively opposite to them.

These arcades at Worcester have been for many years concealed by the bookcases which were ranged all round the walls, in contact with them, leaving only uncovered the compartment (2, 3), in which a fireplace was inserted, and in which the arcades were seen covered with a thick coating of paint. The Cathedral Library was removed to the chapter house in 1641,[†] but the present bookcases are much later. The Chapter in the last year had resolved to remove the bookcases from the walls for the purpose of carrying out the thorough repair of this edifice, which had been for some time in progress, and nearly completed on the exterior at the time of our visit. To facilitate my examination of the state of the interior, and especially of the vault, which exhibited in some parts great and dangerous settlements, the books were removed to the south triforium of the church, and the cases detached from the walls, immediately after the Archæological meeting, thus laying open to view the entire series of arcading.

The scraping of the inner walls of the transepts, undertaken to enable me to trace the various insertions of masonry, had shown that the great stair turrets were built in alternate courses of white and green stone. Some symptoms in the chapter house walls led me to suspect that they would turn out to be built in the same manner, and a compartment was completely denuded of the paint and wash at my request, disclosing the curious fact that the whole of the wall decorations, the niches and arcades, are carefully built in stones of two colours, disposed so as to follow the architectural lines, and ornament the walls with alternate stripes of colour, exactly in the manner of the Italian ecclesiastical buildings at Pisa, Siena and elsewhere, of the eleventh and twelfth centuries (Fig. 13).

I will now describe this wall decoration in detail. Unfortunately the bench which served as a plinth to the work was wholly removed when the bookcases were fixed against the walls. The coating of paint which concealed the colours had been applied before this operation. The niches run in an uninterrupted series all round the chapter house, broken only by the door of entrance on the west side; and there are no larger niches or throne provided for the higher officials. There are ten niches to each compartment, but so disposed that a niche is placed beneath each respond, and consequently one in the centre of the compartment. In the arcade above there are seven arches in each compartment, and therefore a central one standing over the central niche. Each respond occupies an intercolumnar space of the range of arcades, and this intercolumn is equal to that of the arcade, so that the succession of columns is not broken. The masonry of the niches and string course above them is laid with surprising regularity; five courses, consisting of three green and two white, contain the niches, above which the string course, resting upon green, is formed of alternate blocks of green and white. The mortar beds are fully half an inch thick, the vertical joints narrower; the height of the courses, beginning from the bench, are green, 10 inches, white 7½ inches, green 10 inches, white 9 inches, green 10 inches; thus the green bands are of an uniform height and the white bands unequal. The green and white blocks of the string course are of an uniform length, equal to half the space occupied by one niche, and their joints fall regularly over the centre of a niche and over the intermediate space alternately. The joints of the masonry below the string course are distributed, as the drawing shows, with great accuracy, so that those of the alternate courses are in the same vertical line. Thus the joints of all the green courses are exactly in the same vertical, and similarly the joints of all the white courses in another vertical. It will be observed that in every niche one set of the joints coincides with the central vertical, and the other set of joints are in two vertical lines, equidistant from the central vertical, and one foot apart; from this it follows that if the white courses were all shifted horizontally through the space of one niche, the whole of the joints of the masonry would be continuous vertical lines. The niches are separated from each other by a rounded semipillar, and the edges of the domical head of the niche chamfered so as to die upon the semipillar. In the arcade above the string courses, the vertical joints are not placed in a regular system of coincident verticals. Below the capitals there are five courses of alternate colours, namely three of green and two of white, which, in ascending order, are one broad band of green, three rather narrower but equal bands of white, green, white, and one broader band of green. A narrow band of white coincides with the height of the capitals, which are in green stone. The shafts of the columns are of dark green; their bases of white stone are set against the lower green band. The small semicircular arches are formed of white stone; the intersecting arches of green and white stones; the whole against a green ground, as shown in the drawing. In this arcading, the stones of the interlacing arches are jointed in the same manner throughout. But the small white arches are formed either of two, three, or four voussoirs each. The arcade is crowned by a string course with billets; this is worked in alternate blocks of green and white stone, not spaced with the regularity of the lower string course. The respond shafts are built in alternate bands, which, as high as the abaci of the columns, coincide with the bands of the arcade wall; but above the columns these alternate colours are laid with stones of unequal height, without reference to the arcades, as the drawing shows. The shaft rises through the string course, which is cut transversely at the junction to allow of its passage, and is capped by a cushion capital in white stone, bearing the vault rib, the first six voussoirs of which are green, and the remainder, down to the central pillar, of white and green voussoirs alternately.

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[*] Vide my *Arch. Hist. of Canterbury*, p. 87. The stone employed at Worcester does not admit of the florid carving of the above quoted examples. The groined vault shows that the chapter house belongs to the end of the eleventh century, for ribs superseded groins at the beginning of the twelfth century.

[†] Green p. 79.

The place of the original Norman doorway is shown, by the scraping of the walls, to have been in the middle of the west compartment, flanked on each side by one arch of the arcade and two niches. But the present doorway, which was made at the same time as the cloister, in 1372, is awkwardly placed to the north of the centre of that compartment, in order to accommodate the spacing of the cloister vaults.

On the wall of the niches were traces of painting, of which black outlines remained. They were exactly the same in each niche, and represented an angel holding an expanded mantle, as in the old paintings of the stalls of St. Stephen's Chapel, Westminster; but these figures were simpler, showing merely the head and part of the wings, with the hands above the mantle. As the niches are 4 feet high above the seat, the head and hands of the guardian angel would just appear over the head and shoulders of each monk when seated in his stall.

We may now examine the changes by which the external and internal aspects of the chapter house have been brought to their present state. The Norman walls and the responds of the vault shafts exhibit at present considerable deflections outwards, which are greatest at the south point (6, Fig. 8) and zero, or insignificant on the north side at the parts in connection with the Norman passage and treasury. These deflections arose from the pressure of the vault outwards, which, reacting upon the well-supported northern wall, has also carried the central shaft southwards to an extent of an inch and a half, at the height of 19 feet. The respond shaft (at 6), at a height of 16 feet from the ground, inclines southward $4\frac{1}{2}$ inches, its two neighbours $3\frac{1}{8}$ inches, and so on; yet the deflections of the Perpendicular ashlaring outside are insignificant. Whence we may infer that the chapter house was in a state which threatened ruin when the changes in the beginning of the fifteenth century took place, and that their purpose was not to adapt the building to the style and fashion of their time, but to arrest its fall. Now the Norman vault, being provided with cells which sloped downwards (K, Fig. 11), pressed more or less in the outward direction upon every part of the surrounding walls, and to this, as well as to the weight of the walls, the ruin was due, To remedy this, these vaulting cells were taken out, leaving the Norman ribs untouched, as well as the main vault, and Pointed vaulting cells of greater altitude and with horizontal ridges (L, Fig. 11) substituted. The thick semicircular wall containing the Norman window, which followed the circular plan of the arcading below, was taken down to the level of the string course, and a thin straight wall containing a large traceried window erected instead,* which converted the plan, above the string course (Fig. 9), into a polygon. The outward pressure of the new vaulting cells was thus resolved into forces, acting entirely at the angles of the polygon, and to resist these, in accordance with the improved constructive system of that period, thin projecting buttresses (2 feet thick and 5 feet 7 inches broad on the ground) were substituted for the flat Norman buttresses. The thick Norman walls between their buttresses had been thrust outwards. They were accordingly pared away without interfering with their inner ornamental faces, and a new ashlaring converted them into flat faces from the ground upwards, reducing their original thickness of 4 feet 6 inches to 2 feet 9 inches, measured in the centre of the compartment.

I was so fortunate as to obtain a complete examination of the actual construction of the vault and its ribs, hitherto masked by paint and plaster within, and rough concrete and rubbish above. That the vaulting cells had been altered I had perceived from several indications. But alarming fissures in the vault on the southern side, where the settlements are the greatest, made it necessary to denude the surface of its plaster, and this operation was kindly performed during my visit to a sufficient extent to enable me to determine the actual construction of the vault. The upper surface was also cleaned and stripped of its coating. It was thus discovered that the stone ribs are wholly independent of the intermediate vaults, which are neither bonded to nor superposed upon them (Fig. 11, *a*), and have no other connection than the lateral mortar joint and the common coating of concrete above. The sides of the ribs are flat and parallel, neither bevilled nor rebated, and they rise to the level of the vault surfaces above. They are each formed of about fifty voussoirs, nineteen or twenty inches deep and nine thick, and project about four inches below the plastered surface of the vault, in the form of a semicircular rib. The voussoirs are, as above described, alternately of green and white stone, their breadths varying from six to nine inches. Each green voussoir extends completely through the vault, while the white voussoirs are in two courses. This peculiarity, which I have shewn in the sections (Fig. 11 and 11 *a*), distinguishes their ribs from all the known Norman arches, in which the voussoirs are uniformly laid in concentric courses in order; whereas, in these ribs, the alternate voussoirs only are in two concentric courses, and the others solid. By clearing the wide mortar joint for a short distance at the side of the rib at its crown under the roof, I was enabled to insert my rule along the side of the rib and measure the thickness of the vault, which is fourteen inches, and in the Norman parts formed of a light tufa in oblong knobs of about 6 inches by 5 in the lower surface, not squared or faced on the surface of the vault, and laid with thick mortar joints (as in Fig. 11, *a*). But the inserted vault cells of the fifteenth century are built of squared blocks of this stone with fine joints, and their pointed ridges of two courses of long blocks of red sandstone, ten inches wide.

The vault is built solid from the abacus of the central pillar to a height of 6½ feet above it, where in the central pocket above, a flat circular surface is formed, 3 feet in diameter, upon which the central post of the roof stands. The level of the upper crown of the vault rises 7 feet 4 inches above this flat surface, whence, if we subtract the thickness of the vault, it will appear that the solid part of the vault is half the height of the thin upper portion according to the usual Mediæval practice which I have explained elsewhere.† The cylindrical ribs rise from the circular abacus of the central pillar with an angular groin edge between each, as in the central pillar of the apse of the crypt (Figs. 5

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* In the compartments which are in contact with the treasury, blind or "orb" windows are employed, with tracery panels, similar to the windows in the other compartments

† Transactions of British Architects, vol. 1, part 2, p. 6.

and 6). This groin edge rises nearly to the apex of the vault and there dies off, and the groin edges of the newer vaulting cells meet each other below the apex. In all probability the Norman vault was arranged like those of the crypt, namely, the groin edge of the central pillar in each compartment rose to the apex, and there met the groin edges of the vaulting cell, these edges being formed, as in the crypt, of mortar, so as to present an acute section. The abacus of the central pillar is higher than those of the vaulting shafts by 1 foot 9 inches. The abacus has the genuine Norman section. The changes will be better understood by reference to Fig. 9, where I have drawn the compartment 2, 3, as if looking upwards, so as to show the arrangement of the ribs and surfaces. The vault is bounded by two semicircular Norman ribs, AC, BC, and by a Perpendicular pointed wall rib AB. Groins AD, BD, CD, divide the vault surfaces into three, of which ACD BCD, adjacent to the Norman ribs retain the original Norman masonry, but the compartment ABD, which belongs to the pointed vault cell introduced in the fifteenth century, is, with the exception of the lower part, of the different and better masonry above described. EF indicates the sandstone ridge of this pointed vault.*

The restoration which I have described appears to me to be a most instructive example of the methods pursued by Mediæval architects in dealing with a ruinous structure. The whole principle of the repair consisted in remedying the defective mechanical construction of the Norman masons, and nothing was done and nothing removed but what was absolutely necessary to introduce the improved constructive system by which vaults were made more completely to direct their outward pressures upon definite points of the walls which could be defended by greatly projecting but thin buttresses, so that the intermediate walls could be reduced in thickness, and the upper parts relieved by the greater opening of the windows.

That this restoration was not the result of a wanton desire to bring the old building into harmony with the fashion of the time, is proved by the retention of the rich Norman arcading below, which was carefully respected, and of the central pillar with its branching ribs and vault, the latter being only altered in the parts above the windows, where the structural changes compelled the change of form.

A few words in conclusion must be said of the Treasury building already alluded to, built in 1377. The entrance to this (T Fig. 8 and G Fig. 9) is by a short staircase from the side aisles of the choir, which leads up to a strong door H, beyond this is a passage lighted by an outward window U, and leading to the principal room L (25 ft. by 14 ft.) on the north side of the chapter house; from this a door conducts to a small triangular room M on the west side, and thence to another inner room N (13 ft. by 14 ft.), both looking into the cloister. A door O at the south east corner of the great room close to the entrance leads by a crooked passage to a privy closet or garderobe. The great room is lighted by a window T borrowing light from the window U in the entrance passage, and also by a window (F Fig. 10) in the upper gallery. A narrow staircase in the thickness of the north wall conducts upward to this gallery, of which the plan is given (Fig. 10). It extends over the entrance staircase and passage, and leads to a convenient chamber G next to the chapter house with windows looking in various directions, and appears to have been the residence of a keeper or watchman. The passage opens towards the great room by a wide arch E, so as to enable any one stationed in the gallery to see all that was passing in that room. In the pavement over the passage are four openings, A, B, C, D, (Fig. 10) through the vault.

The situations of these with respect to the stairs and passage, are indicated by dotted lines in plan (Fig. 9). A is a square vertical opening, evidently intended to enable a strong bar to be thrust down in contact with the inner face of the door to secure it. B, C and D would enable the watchman to ascertain the presence of persons at the door below, and if necessary would serve as machicolations to annoy thieves. B and C, are cut vertically down through the vault, D is sloped as if produced by the withdrawal of a voussoir. Possibly a lamp was suspended through this hole to light the passage beneath. The whole structure is plain and vaulted in the simplest manner. The vault ribs rest on short shafts, which are sustained by corbels; some of the shafts are cut off abruptly, and there are marks against the wall which show that cupboards or ambreys were fixed against them. The tile pavements are very curious as specimens of the mode in which such pavements were laid in compartments. At Q (Fig 9) is an opening, at the back of which is a square hollow pipe, about six inches diameter, now stopped up. This slants downwards through the thickness of the wall, and served as a hagioscope or "spying pipe," as King calls it. This antiquary describes the Treasury building and its machicolated passage in his "Munimenta Antiqua," 1805, vol. iv. p. 157. He imagines it to have been the "Monk's Prison," and amusingly explains its arrangements on that supposition. In his view the window T is represented as an open arch, similar to the one above it. All the windows and lights of this building are square headed and without hoodmolds.

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* The courses of the Norman surfaces are roughly laid, but appear from below to be laid very nearly perpendicular to the side of the rib as at *g h*, while on the side of the rib which rises from the central pillar they are worked concentrically, the groin being made out by the plaster covering. But this compartment was so distorted by fissures that I am not certain of the true direction of the courses. In the restoration of this vault, which was fully carried out after my examination of it, the surfaces were found to be in such a rough and loose condition as to make it necessary to cover the whole with a new coating of cement, by which its joints are effectually concealed.

NOTE A.—ON THE GEOMETRICAL FORM OF THE CRYPT VAULTS.

Let A B C (Fig. 14) be a triangular compartment like those of the crypt, one side of which (B C), is an arc of a circle described from the opposite angle (A). The other sides (A B, A C), are equal. Let it be proposed to cover this compartment with a vault, of which the ridge (F E) shall be horizontal, and therefore parallel to the line (A D), which bisects the angle (B A C). Every vertical section of the vault as (G K L), perpendicular to the middle plane, (A D E F), to be terminated upwards by a semicircle of the diameter (G L), at the place of section.

Join (F C, F B), and let (D E) be equal to (D C), so that the end section (B E C) is a semicircle whose diameter is (B C). (The curvature of (B C) is so small that we may neglect it in this explanation). It is evident from the figure that the vault will have the form of an oblique semicone, of which (F) will be the apex and (C E B) the base; also that any transverse section (G K L), will be a semicircular arch, of which the horizontal diameter will be at (H), where the line (F C) intersects the plane of section; and (G H) will be the quantity of stilting of the arch. The triangles (F A C, F A B) will be in vertical planes.

If this vault be intersected by two other semicylindrical vaults on each side, perpendicular to the sides (A C, A B), respectively, of the compartment, we obtain the form of the crypt vault as in (Fig 15). This, in which the same letters are used, as in the upper diagram Fig. 14, shows the form of the vaulting surfaces. A plan (A′ B′ C′), corresponding to the crypt compartment B H K (Fig. 1) is placed below to show the arrangements more clearly, as well as the seats of the groins.

The portion of the conical vault of Fig. 14, which would have extended from the apex (F), to the point (P Fig. 13) where the crowns of the central and transverse arches meet, is omitted in the actual crypt; for, although the vaulting cell, which it would form by its intersection with the lateral vaults is geometrically possible, its form renders it inadmissible. * The two opposite lateral vaults meet, therefore, in the groin

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* The form of one-half of the above vaulting cell is indicated by the lines (A F P R A Fig. 15). It is bounded by the vertical line (A F), on the one hand, and by the groin (A R P) on the other. Its upper surface (F R P) is the portion of the semicone, of which (F) is the apex, and (F R) the lower edge, being part of the impost line (F C) of the semicircular arches which constitute this surface. Manifestly (A F R) is part of the vertical surface of which (A′ C′ Fig. 16) is the seat, and the portion of groin (A R Fig. 15) is, therefore, in that vertical plane, and parallel to the edge (*a r*) of the lateral vault. But the groin, from (R to P), results from the intersection of the crown of the lateral vault with the conical surface (F R P). The opening (A R P) of the vaulting cell is, therefore, pointed above and below, and is in the form of a leaf, and the cell itself a mere angular deep recess, manifestly useless for architectural purposes.

(A P). The formation of the curved groins may be shown by examining the groin (G′ N′ Fig. 16), shown in perspective at (G M N, Fig. 15). This results from the intersection of the lateral semicylindrical vault (G *g n* N), with the stilted conical vault (G H K N), of which (G H) is the stilt. The portion of groin (G M), is in the vertical surface (G H M), and is parallel to (*g m*), the edge of the semicylindrical vault. The seat of this portion of the groin, (G′ M′, Fig. 15), coincides with the line (A′ G′ C′), which is the seat of the vertical surface, of which (G H M) is a part. But the groin from (M to N) is the result of the intersection of the vaulting surface (M *m n* N), whose transverse section is a segment (*m n*) of a circle less than a semicircle, with the conical vaulting surface (H K C E. Figs. 15, 14), whose transverse sections are all entire semicircles. The curves of the seats may be obtained by geometrical projection.

The President, Mr. Tite, M.P., rose and said—He had asked the friend, who had been good enough to occupy his seat, to do him the favour to surrender it for a few moments to enable him (the President) to apologise to the learned Professor, who had read the paper, for his inability to be present at an earlier hour of the evening. He had intended to have been so, but was prevented by a public duty which he could not avoid. A division of the House of Commons upon an important question had only taken place about twenty minutes before his arrival in the room; and therefore he had missed the pleasure of hearing the earlier portions of this very learned paper. He was quite sure they all felt greatly indebted to gentlemen who, like Professor Willis, took up architecture, not as a profession, but as a fine art, and with a view to their instruction and information on the principles which actuated the ancient architects and characterised their works. In that respect no one had done more than his learned friend, as they had the pleasure of acknowledging a year ago, when they recommended that he should be presented with the Royal Medal in testimony of the feeling he had just ventured to express. They, as architects, might draw lessons from the learned essay which, on this occasion, the Professor had been good enough to read before them. He thought if they, as professional architects, paid half the attention Professor Willis must have done, to the details of the masonry and the mode of construction adopted by their ancestors, they would do well, and would gain that which every architect desired, viz. an intimate acquaintance with the methods and science of their predecessors; it was idle to be seeking to realise the forms of ancient architecture unless, at the same time, they realised the reasons which had influenced them, and the skill and science which they had brought to bear upon their works. In this respect the paper they had heard this evening was eminently successful. He did not think the architects of the period referred to were unlearned: they were evidently thoughtful and careful men, and devoted their lives to the occupations which engaged them. They were most likely connected with the religious institutions of which they formed a part. They had not the exigencies and claims of social position and family matters which influenced architects of the present day: therefore they had more liberty and more leisure to devote to questions of this sort. With regard to the circumstance mentioned of this alternated colouring, it was interesting to hear of this example which had been found in England. The most remarkable instance he had seen was in Sienna, where the alternate lines of black and white marbles in the great Cathedral and other buildings in that City, had a curious effect, which might teach them how skilfully those materials were used, and how picturesque was the effect produced by their use. He was not aware till now that the same plan had been carried out in England; and if they studied the thing with the same care as the Italian architects had done, they could, do doubt, with the materials at hand, produce effects equally picturesque and beautiful. Previous to inviting remarks upon the subject brought before them in the present paper, he would briefly allude to the two important facts which had been communicated to them this evening. One was the "entire satisfaction"—for that was the language —of Her Majesty with regard to the recommendation that the Royal Gold Medal should be presented to Mr. Anthony Salvin, which recommendation, he was thus happy to find, had met with Her Majesty's entire approbation. The other was the distinguished honour done them by the Prince of Wales accepting the office of Patron of this Institution, in that respect following the example of his great, generous, and good father. He hoped the time would come when they would have the pleasure of seeing the Prince of Wales take the chair, as he had seen the late Prince Consort do, at some of the meetings of the Institute, and that they should find him the same generous, good, and benevolent patron of art as his father had been. Repeating his apology for not having been present earlier in the evening, he would now invite remarks upon the paper read, with regard to the architectural and archæological curiosities which had been brought before them.

Mr. Arthur Ashpitel, V.P. (responding to the President's invitation), said he had the honour a short time back of reading in this room some remarks upon the origin of crypts, tracing them back to the Basilica, or early Christian Church; and he had promised, when opportunity served, to continue the subject down to the Mediæval period. Partly through severe illness, and partly from a great pressure of occupation, he had not yet been able to fulfil that promise. He had listened to the paper read this evening with extreme pleasure and interest, because it had supplied in a manner far better than he could have done it, a description of one of those crypts which he meant to have brought before their notice at a future day. Some years ago the Archæological Association assembled at Worcester, and on that occasion he was requested by the late Lord Londesborough to read a paper upon the Cathedral; but having only three or four days' notice, so far from having time to prepare any written remarks, he had enough to do to prepare a few diagrams, and was obliged to deliver an extempore address, which was afterwards very imperfectly reported. This crypt of Worcester Cathedral interested him extremely. It was at a time, they might remember, when a certain number of their Fellows were most earnest for what they called the Saxon period, and amongst the rest the late Mr. Edward Cresy, and there was an attempt to make up a theory to prove this crypt to be Saxon. He went down to Worcester, and after looking at the different authorities he thought there was one overwhelming proof that this crypt, which was said to be that built by Oswald, was really the work of Wolstan; and although there is a slight discrepancy between the account of William of Malmesbury, as printed in Wharton's Anglia Sacra, and that in the "*de gestis pontificum*," yet the substance of the story is clear. It relates that the new Cathedral was built close to the old one formerly erected by Oswald, and in the same churchyard, which latter was then about to be pulled down. That Wolstan, looking at both, was moved to tears, and when remonstrated with by the bystanders, who told him he ought rather to rejoice that he was spared to see a building so much larger and more beautiful than the old one completed under his auspices, made answer that he wept to think men had lost in holiness of life and care of souls what they gained in the art of pompous building. After which the old Cathedral was pulled down.* Nothing, continued Mr. Ashpitel, could be more conclusive that this was Wolstan's crypt. What then was his horror at finding that some gentlemen, members of the Archæological Institute, had been told that he had said just the direct contrary, They were told at the congress lately held at Worcester, that he had affirmed that it was Oswald's crypt—notwithstanding in the plan published in the volume of Worcester Transactions it is clearly engraved "The crypt, said to be Saxon, but by Wolstan, 1084." He would not have intruded these remarks had it not been that he found last year this story had got about. He remembered this crypt well, and had seen it many times since. It was, as stated by Prof. Willis, very dark, and unless it was properly lighted they could not make much of it. On one occasion his friend Mr. David Roberts was with him, and the crypt was lighted up specially, when Mr. Roberts made some sketches which he hoped he should one day produce as a large picture. With regard to the plaster on these crypts, he believed the plastering of these ancient buildings was not—to use the milder term—for "fictile" purposes, nor was it done for a sham, but simply because it was the best material for what they called fresco painting, but which is more properly a species of tempera. They could not paint well upon stone. Prof. Willis would remember this was the case in the crypts of Rochester cathedral, which are plastered, and where there are still a considerable number of monograms in colour, apparently stencilled; and Mr. Scott would tell them that in Westminster Abbey the arches in the refectory, the work of Edward the Confessor, had been plastered and in some places had been coloured in the same way, so that they must acquit the Mediæval architects of anything like sham in this respect. They were fond of ornamenting their buildings with painting, if it were only with a simple line to relieve a moulding and break a flat surface, and they must give them the credit for having the good sense of seeing that plaster was the best ground they could use to put their colours upon. With regard to the curious effects of these groined spandrils being curved, it was a singular fact that England seemed to have outgone all other countries in the ability and the fancy, and the boldness with which the groining was executed. In examples abroad they had, with but few exceptions, simply an intersection of one groin with another, the points of the spandrils being generally at right angles to the wall and to the ridge rib. In England was invented that vaulting which, beginning with simple groin ribs or *ogives*, and then proceeding in later styles to subdivide these by *tiercerons*, and then by *lierne* ribs, had at last developed itself in that domical, or rather contra-domical, form we now call "fan tracery;" one of the boldest, most fanciful, and most scientific, so to speak, of ceilings they could possibly put over a building. Whether this was the result of mathematical science or not it was difficult to say. It is common to assert the Mediævalists were ignorant of every sort of science. He could scarcely believe that men who were constantly working with compasses in their hands could be utterly without a knowledge of geometry. He thought they must have taught themselves geometry from going again and again over the problems connected with tracery, and particularly groining. The intersection of curved surfaces must have been a thing constantly before them, and they must have found the lines to get out the centering to support the groin ribs at these intersections, or they could not have been put up; and this could only be done in the simplest way by a system of ordinates and co-ordinates, so that he could not think the architects of those days were as ignorant of the principles of mathematical science as some people seemed to think. On the other hand, there was no doubt they learnt very much by practice. They put up a thing, and if it failed they made it stronger next time, and, if it was found to be unnecessarily strong, then they reduced it on another occasion, so that he believed there was a great deal of scientific as well as practical knowledge amongst the Mediæval architects. One thing peculiar to England was that species of groining, assuming surfaces of almost conical principle. These were, however, matters of dry mathematics, which he would not trouble them with. He could only say further he had experienced extreme pleasure in listening to this paper, and he would take the liberty of asking the learned Professor one question which arose out of it. He had had the honour in this room of pointing out the way in which the crypt developed itself from a small place under the altar of the early Christian Basilica till it became a little chamber, and then at last a small church, under the altar approached by one and sometimes two flights of steps. It was his hope at a future time, unless it was done in the meantime by abler hands, to continue the history of the crypt from the point at which he had left it, when it became gradually of larger and larger size from the time of the early Christian Basilica down to the early part of the decorated period. But the question he had asked over and over again, both in this room and before the Society of Antiquaries, was this—why it was that the period when the crypt had become a most important and remarkable feature of very many churches—when it had become as large as the chancel itself—as in the case of Old St. Paul's; just at the period of the transition from the early English to the Decorated period, in the most palmy period of Mediæval architecture, why it was all at once the building of crypts ceased altogether? Subsequent to that period there was no large decorated or perpendicular crypt. Here and there small crypts incidentally existed, but the great feature they admired so much at Rochester and Canterbury, and that which but for the great fire of London they might still have had to admire, St. Faith under St. Pauls, was going out of fashion, without any possible reason being assigned for it. There was no great religious change or disturbance, no alteration either in habits or worship. There was no reason that he could see or hear of, either in this room or that of the Antiquaries, why this fine feature of our churches should have been wholly and entirely abandoned, and he trusted the learned Professor would be able to throw some light on the subject.

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* There is another equally strong proof that the crypt is the work of Wolstan, and that is taken from a MS. in the Harleian collection (4660, p. 16) dated 1092. It is a charter of Wolstan's settled in a synod which he says he had convened "in the monastery of St. Mary, in the crypts which I have built from the foundations." An attempt has been made to show that the expression "Sanctæ Mariæ in criptis," might be the name of the church, Saint Mary of the Crypts, but all the other documents call it "S. Maria Genetrix," Besides, the correct Latin would have been S. Maria *de* criptis, just as we have S. Maria *de* arcubus," "S. Maria *de* Loretto," and many other instances.

Mr. G. G. Scott, V.P., said there was but little he could venture to add to what had fallen from Professor Willis and Mr. Ashpitel; but there was one remark he would make which was suggested to his mind by the two papers of this evening, which had been so well coupled together. That was as to the extreme importance of a society like this doing all it could to urge and encourage its members and others to obtain and preserve illustrations of their ancient buildings. The first of the papers read this evening had been most admirably illustrated by photographs of one of the most interesting series of ancient sculpture existing in England. Photography was almost the only means of illustrating those works of the sculptor's art in their decayed state: it was almost impossible to give due effect to them by drawings. He thought they ought not to leave it wholly to the unaided efforts of a private Association to carry out a work of this kind, but that the funds of the Institute might be properly applied in aiding it to procure illustrations of the rapidly decaying structures of ancient times. It was in many cases impossible to do it by other means than photography, and he thought they owed a great debt of gratitude to the Architectural Photographic Association for the way in which they had now taken it up. Closely akin to this subject was that which Professor Willis had followed up with his photographic eye and mind; for he seemed to possess the peculiar art of seeing through a stone wall, and by his peculiar talent he did that for the structure which photography did for the art of these buildings. Although they could do a great deal in promoting the illustration of these buildings by means of photography, it was not so easy to find persons capable of doing the work of Professor Willis, because it was rarely they met with a person possessed of anything approaching to that peculiar faculty which the learned Professor had for this description of architectural illustration. What he however (the Professor) could do almost at first sight others might do by giving more study to it. Although it was difficult for them, as architects, in overhauling an ancient building to get time to go into these things sufficiently, it was a crying evil that they did not in some manner make time for it. He thought they must all of them have upon their consciences the pressure of sins of omission in this matter; that they had let opportunities pass by without making records which were so important for the illustration of Mediæval architecture. On reading one of the papers read by Professor Willis before this Institute many years ago, he was struck with his remarks on the curvature of the ribs of vaulting as being arbitrarily varied so as to suit them to their peculiar positions—sometimes not exactly taking the line which would be derived from the mathematical structure; and he (Professor Willis) advised that any person who had an opportunity of putting scaffolding up to a groined vault should take the curvature of the ribs, and see whether they followed the exact mathematical line, or whether they were thus varied to adapt them to suit the exigencies of the case, or to enhance the beauty of the groining. Upon reading that suggestion half a dozen places occurred to him where he had erected scaffolding and had never thought of this thing. They ought, therefore, to keep it in mind, and avail themselves of each opportunity which presented itself. If they could not find time to do it themselves, they might employ some one in whom they had confidence to do it. Many of them had subordinates who were good antiquarians, and capable of making valuable researches; and it was their bounden duty to have it done or to do it themselves. As to the matter itself which had come before them, it had been dealt with so thoroughly by Professor Willis that he saw no room for further observations upon it. He had brought before them a curious instance of the systematic use of coloured stones, but it was not a solitary one. Examples of the same kind were to be found in some of the Northampton churches, exhibiting courses of white and irony-brown stone, but it was not by any means a general principle of English architecture. With reference to what Professor Willis had said in the construction of the Chapter-House as to the pressure on the outer walls, it ought to teach them that in determining the form of an arch, they ought not to be actuated by the mere rules of particular styles. There was no doubt that the great reason for adopting the pointed arch was that they were continually finding in the larger buildings the round arches giving way, and therefore they wanted a higher arch. Those who had frequently erected large round arches to the support of great weights, and standing on walls of any considerable height, must have found this to be the case, unless they made the abutments enormously bulky, as in the Baths of Diocletian, where the aisles are almost blocked up with solid masses of masonry. It does not seem to have been the case, as Dr. Whewell had suggested, that the pointed arch was first used for the side arches of vaulting to accommodate narrow bays to the height of the wider span. They found, on the contrary, semi-circular arches used later in these side bays than was the case in the great centre spans. The real cause was to provide an arch of less outward pressure for positions where structural reasons demanded it. If architecture should come back to pure common sense, they would learn that though they built in the round-arch style there were many situations in which common sense almost demanded the use of the pointed arch; and though building in the pointed-arch style there are positions in which the round arch is much more convenient, and any really practical style ought to admit of perfect liberty in this respect. As to the rough architecture, such as that described in the Crypt at Worcester, in which the rude stone work was encrusted with plaster, he considered that Professor Willis was wrong in saying he thought anybody would regard plaster so used as a sham. If any persons thought so, he (Mr. Scott) was not one of them. It was anything but a sham. But this fact they all knew, that the architecture of the present day had been degraded by what was really sham, and as every one knew whether what he was doing was so or not, it behoved them to do, each in his own individual sphere, his very utmost to relieve their noble art from this degradation.

Professor Kerr, Fellow, would beg Professor Willis to include in his reply an answer to this very interesting question. They all knew how complex was mediæval construction as regards the use of the arch, with its buttresses, to resist the concentrated pressure of groining, its pinnacles to add to the value of the buttress, and so on, he should like to ask Prof. Willis—who was the very best man to refer to on such a subject—whether he had observed in mediæval work anything equivalent to chain bond, not in iron, but in the form of cramps or dowels. Such continuous bond in the case of this chapter-house would have obviously prevented the initiation of the destructive process which rendered it necessary to re-erect a portion of the building in the 15th century. Also had the lecturer observed anything like the equilibration of the arch in mediæval work which again might have of itself rendered this structure secure? *

Mr. John P. Seddon (Hon. Sec.) said that having had the privilege of a previous explanation

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* I have been since informed by a friend that Viollet le Duc shows iron chain bond of very early date; and I remember that Prof. Willis in his disquisition on Fan Groining (Transactions R. I. B. A.) shows something very like Equilibration.—R.K.

from Professor Willis of the subject he had brought before the meeting that evening, and having had occasion only a few days before to go to Canterbury, he had taken some trouble to examine whether there was anything in the ribs of the crypt existing there corresponding to the class of treatment at Worcester which had been described to them. He found that the whole of the vaulting ribs of the crypt were likewise covered with plaster. He also tried to discover, where the angles happened to be broken away, whether the same description of core had been prepared for it; but as far as he could discover, without aiding the dilapidation by pulling any of it down, he believed the stone under it was nearly of the same shape as the finished plastered surface of the rib itself—but it was certainly rough, and had evidently never been dressed as if intended to have been left exposed, and therefore he assumed that it had been prepared for plastering from the first; and upon the plaster there still remained throughout the crypt many indications of painting, while in one apsidal chapel beneath that of S. Anselm, which had escaped the effacing coats of whitewash that had obscured the rest, there still remained elaborate paintings of the Norman era covering the whole surface of the walls and vaulting. It would appear therefore that the reason given for the plastering was, as Mr. Ashpitel had said, for the express purpose of providing a surface for such decoration, and with no intention of effecting any "sham."

Mr. C. F. HAYWARD (Hon. Sec.) said, allusion having been incidentally made by Prof. Willis to Margam Abbey, which he had stated was unknown to him previously, he (Mr. H.) might observe that it was a very beautiful and interesting ruin standing in the grounds of Mr. C. R. M. Talbot at Taibach in Glamorganshire. The chapter-house particularly was well worthy the attention of all, and had afforded to himself immense pleasure as well as instruction. Margam Abbey was placed in the list of subjects recommended for drawings to be made for the Institute prizes of this year. He therefore took the opportunity of reminding gentlemen of this, and at the same time would observe that permission must be obtained in order even to see the ruins, as they were standing in private gardens.

Professor WILLIS said it would be difficult to explain his views with respect to crypts without entering into a long discussion, which the late hour preventing him, he could only refer to his histories of Canterbury and Winchester, in which he had endeavoured to illustrate the origin and use of this part of the early churches. He would merely remark that the crypt, as an ecclesiastical member of a church, might be said to have been abandoned in England with the Norman style; for the few later examples were either beneath continuations of Norman buildings with Norman crypts, and therefore constructed to carry the floors eastward on the same level, or higher, as at Canterbury, Winchester, York, and Rochester; or else to serve as a foundation for parts of the church which stood on the slope of a hill, or other uneven ground, as at Glasgow, Hereford, and Siena. In great Early English churches, erected like Salisbury upon new ground, no crypt was employed; and Worcester Cathedral, begun four years after Salisbury, offers an Early English choir standing on a Norman crypt, and extended eastward beyond it with a pavement placed on a lower level, instead of being raised by an Early English continuation of the Norman crypt.

In reply to Mr. Kerr, the Professor referred to the pier arches of Westminster Abbey and to Lincoln Cathedral, in which cases iron ties and wooden bond timbers are introduced at the feet of the arches, as a tie to prevent them from spreading.

THE PRESIDENT said it was now his pleasing duty to propose a vote of thanks to Prof. Willis for his very able and instructive paper; and he had no doubt it would be passed by acclamation. He quite agreed with all Mr. Scott had said with regard to the advantages of photography as applied to the illustrations of architectural works. He hoped in course of time they should possess a judicious and useful collection of these curious sculptural remains through the art of photography, and he was sure they felt indebted for what Mr. Lightly had done in that direction.

DESCRIPTION OF THE PLATES.

ILLUSTRATIONS OF THE CRYPT.

Fig. 1. Plan of the central portion of the crypt, described at pp. 214, 216. *k l m* is a mass of masonry, the foundation of an Early English pier above. A similar mass is on the south side. The three central arches of the apse are walled up to within a few inches of their western faces, and the eastern part of the crypt beyond them filled up with earth, as shewn by the dark shade. The intermediate pillars of the crypt rest upon a continuous foundation wall, which follows the curvature of the apse (from X to Y) and the central range upon a similar wall, which meets the former wall at Y.

Fig. 2. Section of part of the crypt, to explain the construction of the vaults, p. 217.

Fig. 3. Perspective dissection of part of the vault, p. 217. In this figure, the lower part of the nucleus or core is represented by the lithographer with an appearance of greater precision in workmanship than it really possesses.

Fig. 4. Horizontal section of vault immediately above the abacus, p. 217.

Fig. 5. Horizontal section of the vault ribs of the central pillar (W, Fig. 1), pp. 214, 216, 222.

Fig. 7. Perspective sketch of arches (K, M, L) and groins (CA, DA, AB,) of Fig. 1, p. 215.

Figs. 14, 15, 16. Geometrical forms of the vault, p. 224.

ILLUSTRATIONS OF THE CHAPTER HOUSE AND TREASURY.

Fig. 6. Horizontal section of the vault of the chapter house, immediately above the abacus, p. 222.

Fig. 8. Ground plan.

The dividing points of the severies are numbered from 1 to 10 consecutively. These numbers apply to the buttresses, ribs, vaults, &c., in common.

A C D E. The line of the section, Fig. 11.

F G. The original Norman doorway in the centre of the compartment, 9, 8.

H. The doorway introduced when the cloister was built c. 1372, and placed out of the centre of the compartment to suit the arrangements of the cloister.

K. Norman passage from the cloister to the space south of the choir, vaulted without transverse arches. The groins pass unsymmetrically from one side wall to the other, on account of the doorway Q.

L. Pointed archway.

M. Passage leading to the Prior's buildings at N, now destroyed. The two latter passages are formed by the piers which support the east part of the treasury added in 1377, which also extends over the vault K, and over P Q.

O. Entrance archway, part of the cloister work, c. 1372.

P. A triangular apartment included between the chapter house, the Norman passage wall, and the wall of the cloister, and entered by a Norman doorway at Q. A staircase has been lately set up in this apartment to give access to the rooms above.

R S. Two recesses with a stone seat in each, covered over head by a remarkable horizontal arch, formed of large blocks of sandstone. The wall which divides R from P is only 1 foot thick.

T. Stairs leading to the treasury from the south-west corner of the vestries of the presbytery, now the choir of the cathedral.

Fig. 9. Plan of the chapter house, taken at the level of the window sills, and above the abacus of the central pillar, in the line F G H, Fig. 11, including the plan of the treasury.

A to F shew the arrangements of the ribs and surfaces of the vaults, explained at p. 223.

Fig. 9 *a*. Profile of the mouldings of the chapter house windows.

Fig. 10. Plan of the upper floor of the treasury. This building is fully described at p. 223.

Fig. 11. Section of the chapter house, on the line A 7 C D E, Fig. 8. In this section, as in the plans, the Norman walling that remains is indicated by a dark tint, and the Perpendicular work by a light tint and different hatching.

The half A C of the section is taken through a vault rib, 7 C, and passes close to the side of the buttress A, for the purpose of shewing it in elevation rather than section: the pinnacle shaft at the top has been removed in the recent restorations. The line from R upwards shews the surface of the original Norman wall. The timber roof was taken down and sold with the lead by the Puritans in the civil war, consequently the framing shewn in the section was set up after the Restoration.

The half D E of the section passes through the middle of a compartment. The original extent and thickness of the Norman wall is shewn at E M N, M N being the window arch, of which one remains on the north side (p. 219.) O P is the outer face of the Perpendicular wall. Q the section of the part of the Norman vault, which was undisturbed by the restoration in the fifteenth century. K, the part of the Norman vault curved downwards to the wall, was removed and replaced by the pointed vault, of which L is a section of the horizontal ridge (*vide* p. 222).

In the section G S T of the great rib, the green voussoirs are tinted dark, and the white of a lighter shade. It will be seen that the first six voussoirs G S are green, and the remainder, from S to T, alternately white and green The green voussoirs being in one piece extending through the thickness of the vault, and the white in two pieces or courses, as explained at p. 222.

Fig. 11*a*. Transverse section of a vault rib and vaults of the chapter house (p. 222).

A B. The parti-coloured rib with parallel sides.

A and B are in one piece in the green stone, and in two pieces, as in the drawing, when of white stone.

C C. Rough lumps of light tufa forming the vaults of the Norman part.

D. The plastered surface.

Fig. 12. Vertical section through the room G (Fig. 10) of the treasury, the room above and the passage below; taken parallel and near to the outer surface of the Norman wall of the chapter house, to shew the remaining traces of its exterior and the position of the window, explained at p. 219.

Fig. 12*a*. Section of window-mold and arch above it.

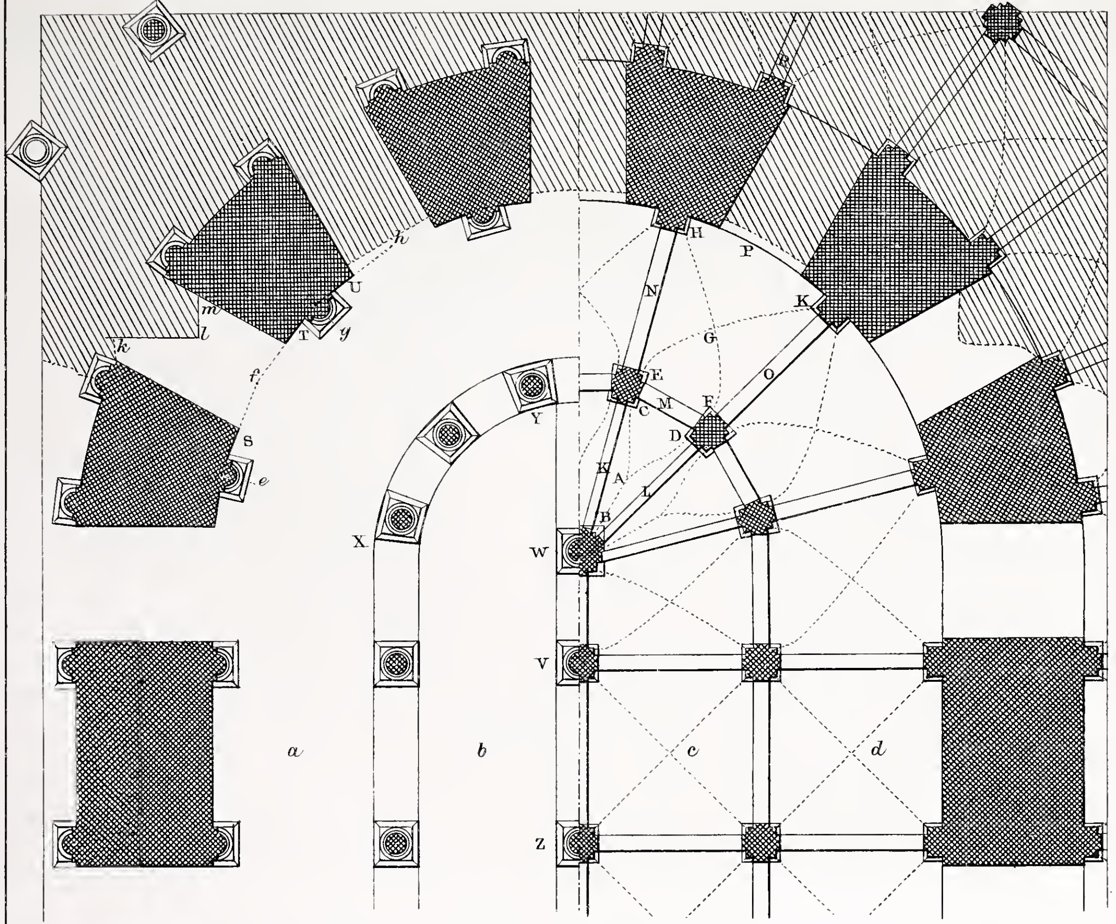
Fig. 13. Elevation of one interior compartment of the chapter house, with the traces of the original doorway. This elevation is shaded, so as to exhibit the distribution of the green and white materials (*vide* pp. 220, 221). Mr. Perkins informs me that the green stone is from Higley, above Upper Harley, on the Severn; the white stone is the oolite of Bredon Hill or Bath; and the red stone (employed in the Perpendicular alterations) from Holt. Above the arcades, the right half of the drawing shews the inserted window and vault rib of 1400; and the left hand the Norman window, the position of which is determined by the remaining one shewn in Fig. 12 (*vide* p. 219.).

Fig. 13*a*. Section of wall to shew the disposition of the interior surfaces. Profiles of the mouldings, indicated by the letters of reference, are given in the upper part of the plate.

Fig 13*b*. Horizontal section through the niches.

Figs. 14, 15, 16. Diagrams to illustrate the geometrical forms of the crypt vaults, explained in Note A p. 224.

Fig. 1.



Ground Plan. .... Vault Plan.

PLAN OF THE CENTRAL PART OF THE CRYPT.

Scale

0 1 2 3 4 5 6 7 8 9 10 20 FEET

Fig. 14.

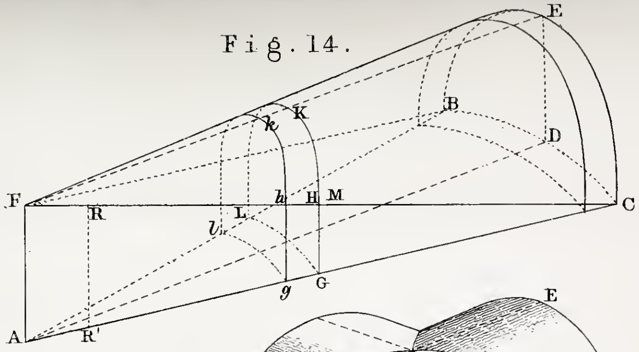


Fig. 15.

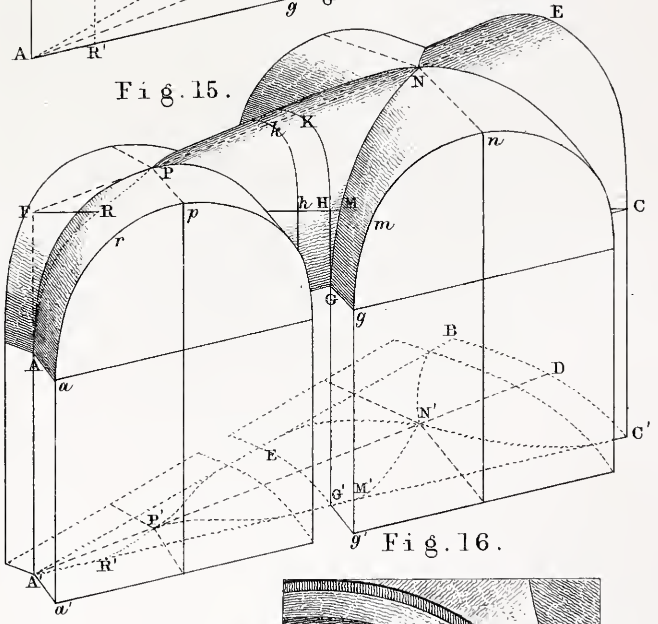
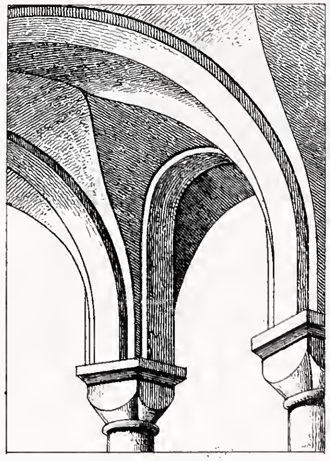


Fig. 16.

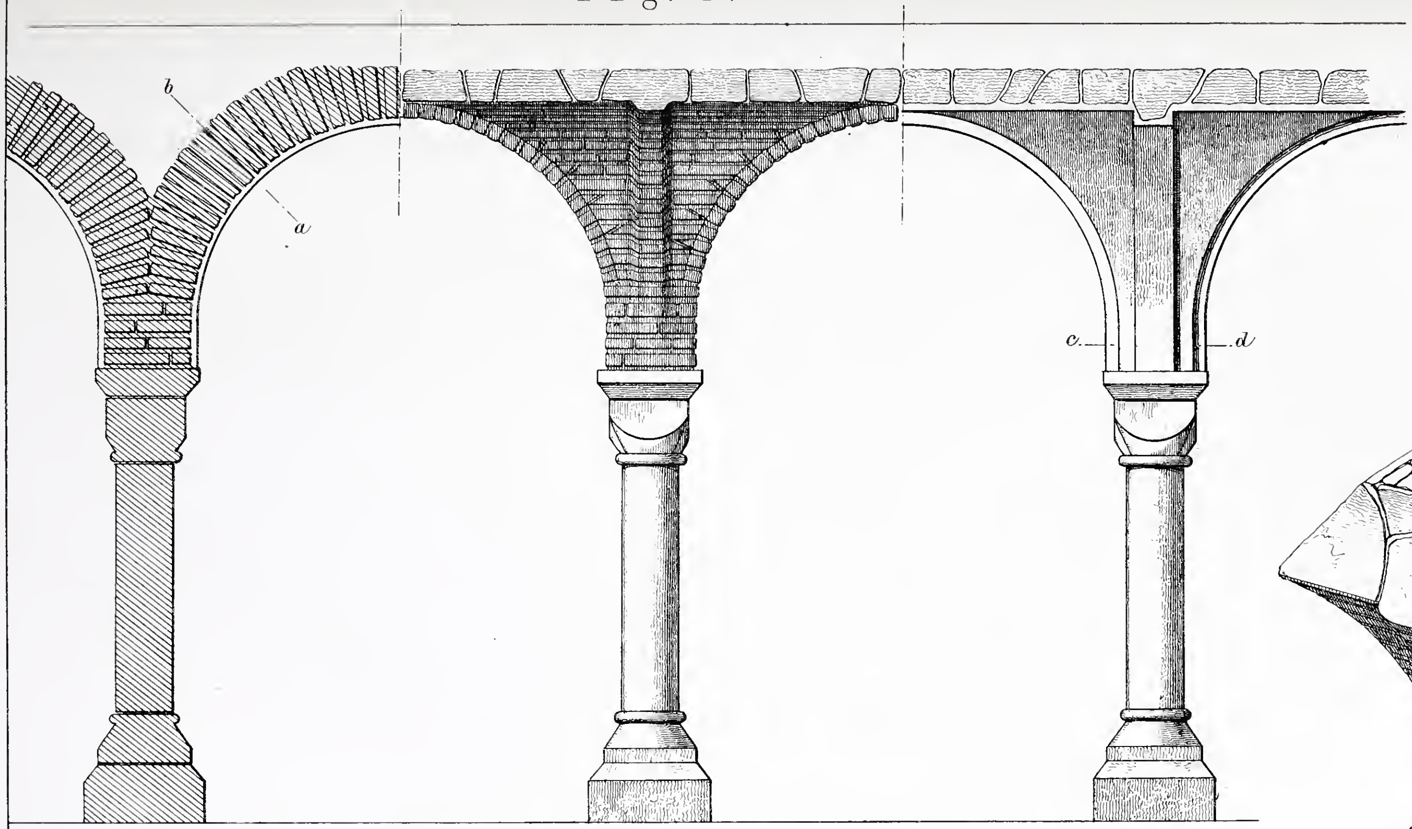
Fig. 7.



R. Willis, del.

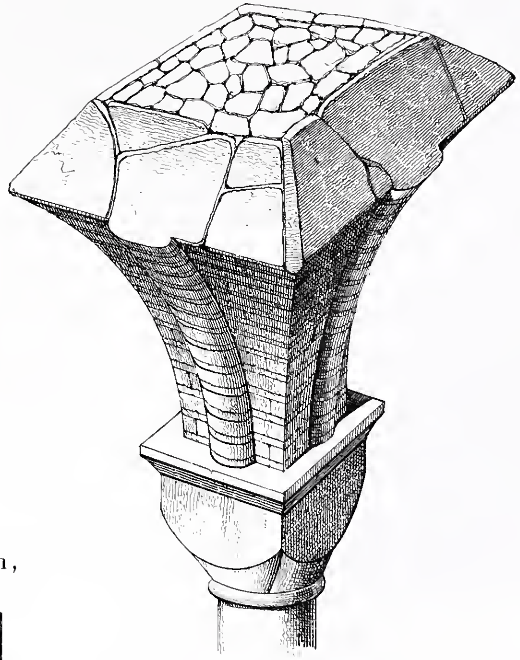
J.R. Jobbins.

Fig. 2.



Construction of the Crypt.

Fig. 3.



Quarter Plan of Abacus
Central Pier of Chapter House.

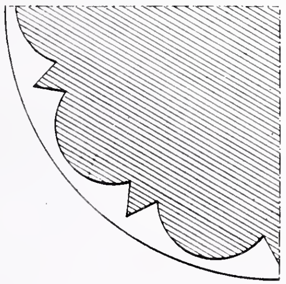


Fig. 6.

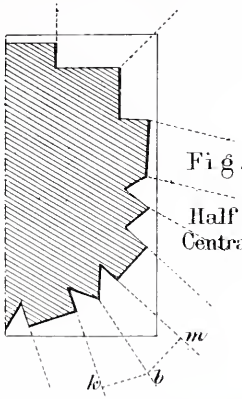


Fig. 5.

Half Plan of Abacus
Central Pillar of Crypt.

Horizontal Section,
at *c. d.* Fig. 2.

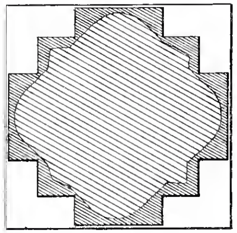


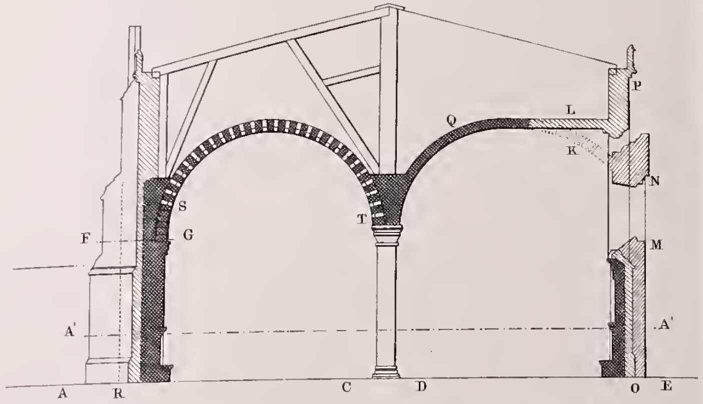
Fig. 4.

Scale to Figs. 4. 5. 6.

R. Willis, del

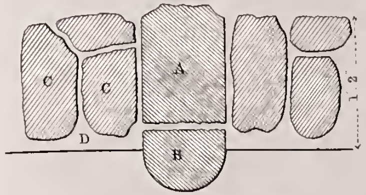
J.R. Jobbins.

Fig. 11.



Section of the Chapter House on the Line A.C.D.E. Fig. 8.

Fig. 11a.



Transverse Section of Vault Rib & Vault.

Scale 3/4 Inch to a Foot.

Fig. 9a.

Profile at B.

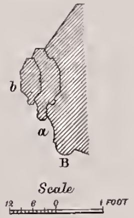
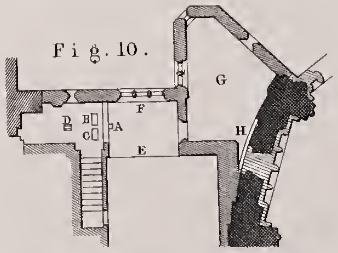
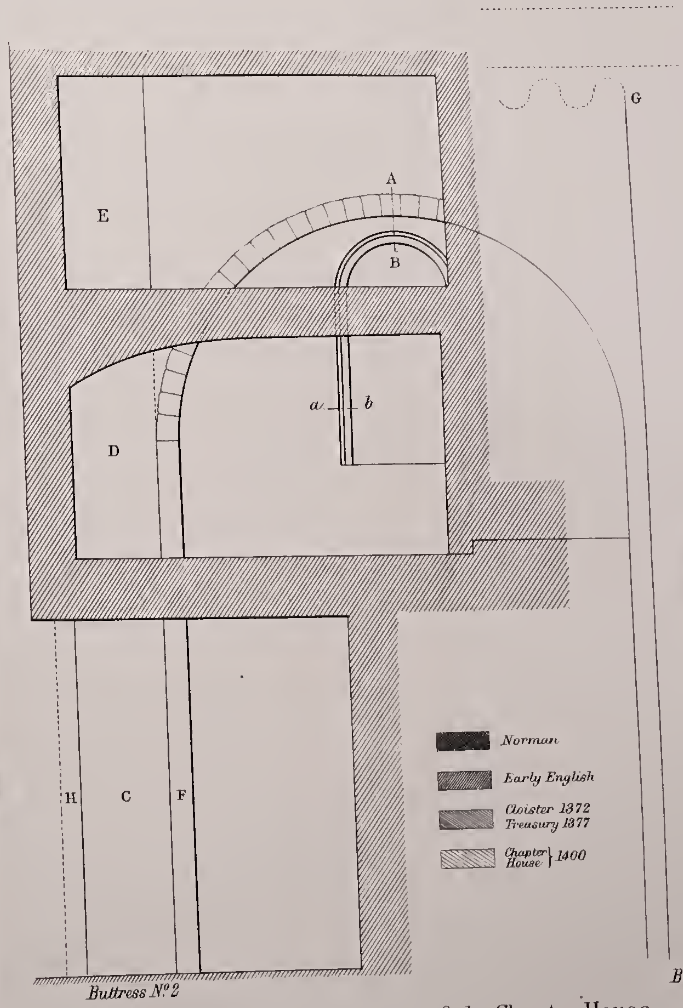


Fig. 10.



Plan of the Upper Floor of the Treasury.

Fig. 12.

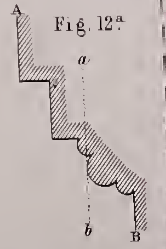


Remaining Vestiges of the Exterior of the Chapter House.

Scale.

0 5 10 FEET

Fig. 12a.

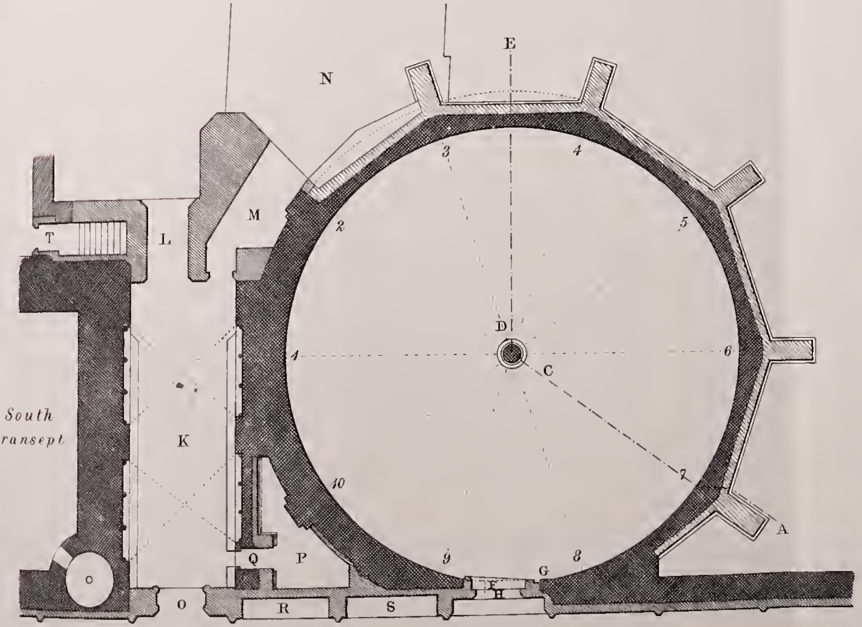


Section of Moldings.

Scale.

0 1 FOOT

Fig. 8.

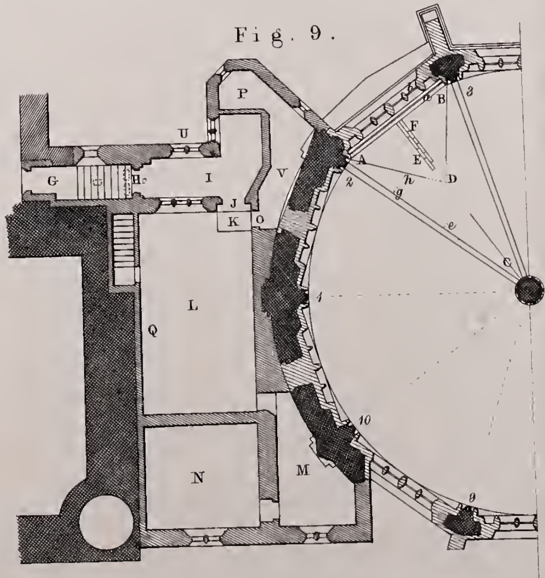


Ground Plan of the Chapter House, Worcester. on the Line A'.A'.

Scale

0 10 20 30 40 50 FEET

Fig. 9.

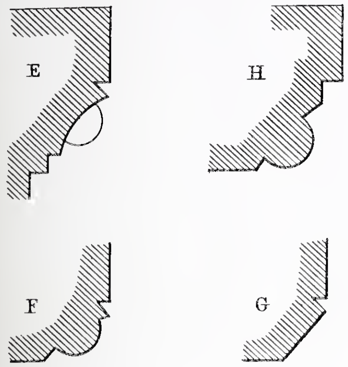


Plan of Treasury and of the Chapter House, above the Window Sills on the Line F.G. Fig. 11.

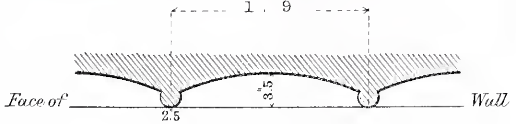
R Willis, del.

J.R. Jobbins.

Details at E.F.G.H.



Details of Fig. 13a.



Plan of a Niche at K.

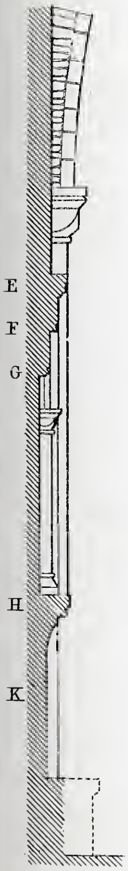


Fig. 13a.

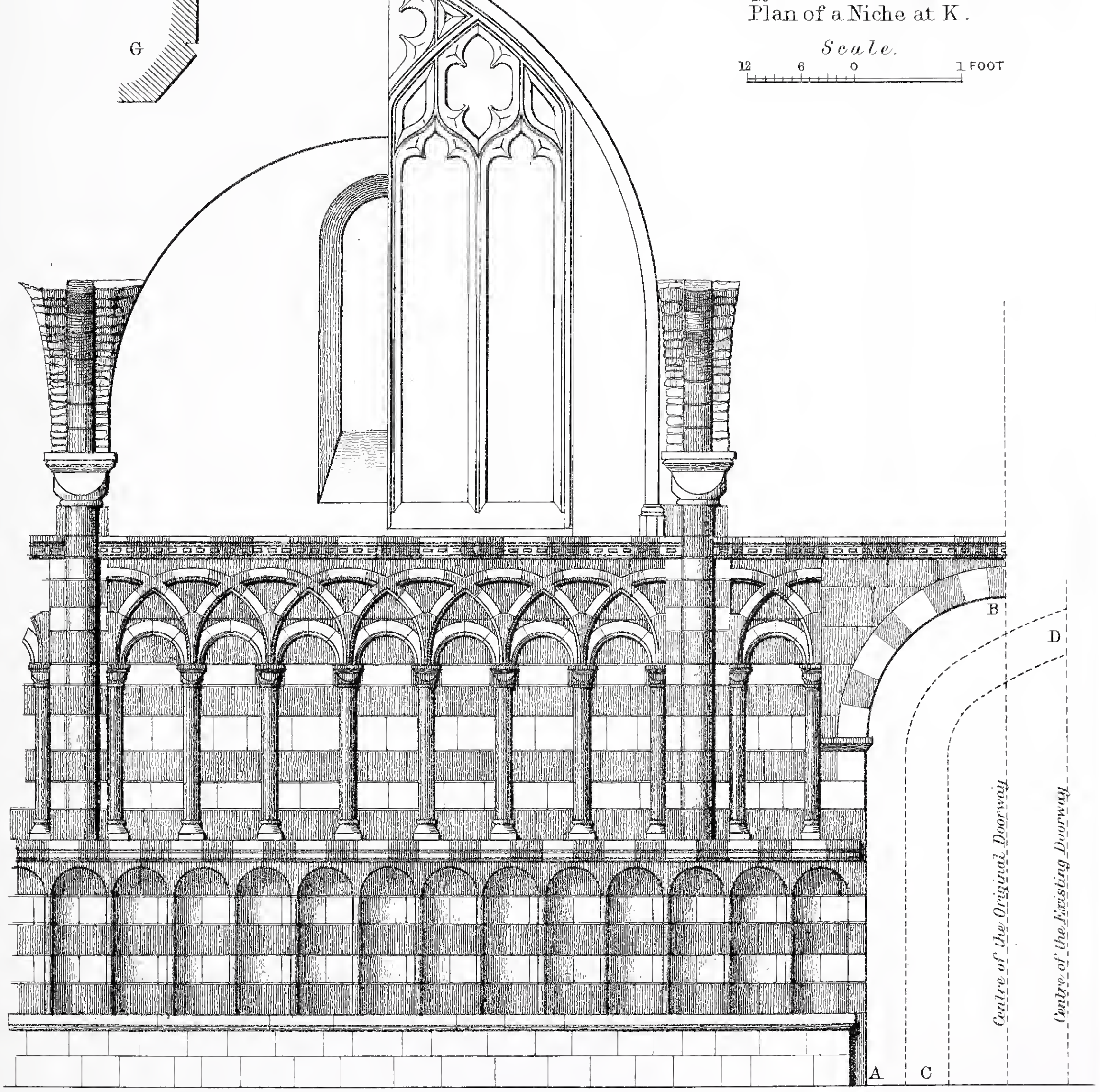
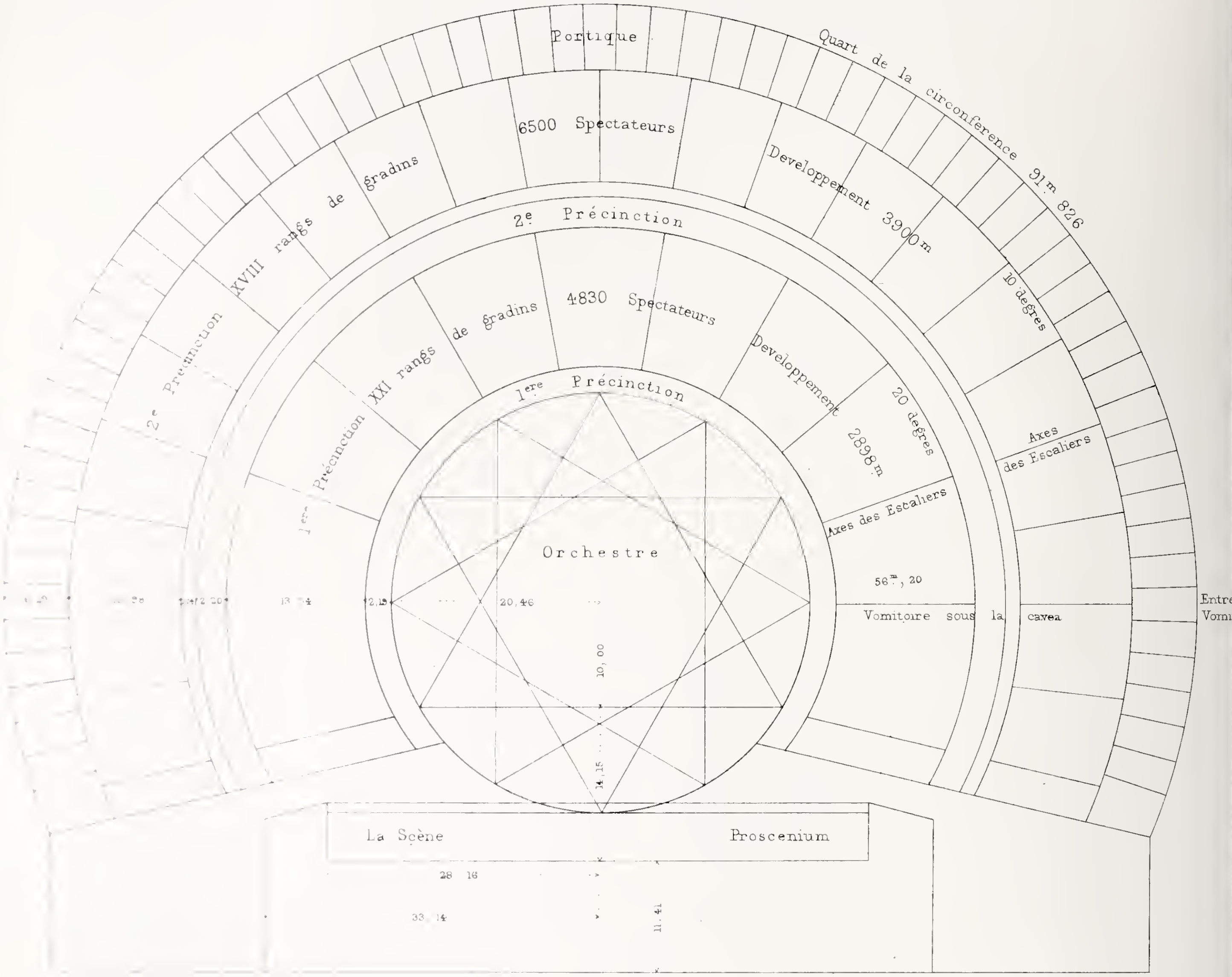

B
D
A
C
Centre of the Original Doorway
Centre of the Existing Doorway

Fig. 13.

Interior Compartment of Chapter House, Worcester.

R. Willis, del.

J.R. Jobbins



PLAN THÉORIQUE DU THEATRE DE PERGA EN PAMPHYLIE.

1ère Précinction P.ers 2898. Spectateurs 4830 }
2e Précinction 3900, Spectateurs 6500 } *11.330 Sp.*

Total des Pr de Grad 6798 Metres de longueur.

à 0,60 par place

à 0m 50 cent par place 13 596 Spectateurs.

Ne sont comptés

ni l'Orchestre

ni les Corridors des Précinctions

ni le Portique supérieur

Lithographed for the R I B A by Kell Bros

At the Ordinary General Meeting of the Royal Institute of British Architects, May 18, 1863, the following Remarks were made by Monsieur CHARLES TEXIER, Member of the Institute of France:—

NOTE SUR LA VILLE DE PERGA EN PAMPHYLIE, ASIE MINEURE.

LA Pamphylie, une des provinces les plus riches et les plus fertiles de l'Asie Mineure, occupe toute la côte sud, connue aujourd'hui sous le nom de Caramanie. Elle est bornée à l'ouest par les montagnes de La Lycie, et à l'est par le fleuve Eurymedon, aujourd'hui Manafgat, qui la sépare de La Cilicie; elle s'étandre au nord jusqu'à la chaîne du Taurus Pisidien. Elle est arrossée par trois fleuves principaux: Le Catarhactes (Douden), Le Sarus (Ac-sou), Le Cestrus (Sarison), et L'Eurymédon.

Le territoire se compose de vastes plaines à peine séparées par quelques ondulations de terrain, aussi cette contrée, abordable de toutes parts et presque sans défense naturelle, a-t-elle été occupée dès les premiers ages par des migrations de tribus venues du continent et des îles; on ignore le nom qu'elle portait dans la haute antiquité, le nom de Pamphylie (Πάν φυλὴ, toute tribu), qu'est purement grec, lui a été donné par les Colons de cette nation. Selon Strabon, les Grecs, compagnons d'Agamemnon, y arrivèrent peu de temps après la guerre de Troie, sous la conduite de Chalcas et d'Amphiloque. Il est certain, cependant, qu'à cette époque la Pamphylie renfermait déjà quelques populations aborigènes des Pisidiens, des Lyciens, et quelques colons phéniciens; il est probable qu'elle se trouvait sous la domination des rois de Cilicie. Quelques médailles anciennes portent des légendes en langue inconnue, probablement en Cilicien.

Les villes antiques de la Pamphylie, à l'exception de celles du Littoral, furent dans l'origine établies sur des hauteurs, selon l'usage des peuples primitifs; on en compte trois principales, Perga, la métropole, Syllæum, et Aspendus. Les deux villes du Littoral, Side et Attalia, sont de fondation greque, la dernière fut batie par Attale Philadelphe. Perga, la métropole, à laquelle nous consacrons cette courte notice, était construite sur la bord du Cestrus. Les ruines qui subsistent encore dans un état de conservation remarquable, occupent la base d'une colline quarrée, sur laquelle on reconnait les vestiges des plus anciens édifices. Toutes les ruines dans la plaine sont des ouvrages grecs ou romains. Dès la plus haute antiquité Perga était célèbre par son Temple de Diane pergéenne. Cette divinité est représentée sur les médailles de Perga sous la forme d'un cône, ou d'une borne; le simulacre est placé au milieu d'un temple, avec deux figures de sphinx ou de griffons de chaque côté; l'exurgue porte l'inscription, ΜΑΝΑΨΑΣ ΠΡΙΙΝΑΣ. Chaque année, dit Strabon, La Diane pergéenne était honorée par des processions ou panégyries, qui appelaient dans la ville un grand concours d'étrangers. Les cérémonies qu'on y pratiquait avaient une grande analogie avec celles de la déesse de Comana; c'est azzez dire que ce culte se confondait avec celui d'Astarté ou de la Diane Persique. Le culte d'Artemis parait avoir été la base de la religion de toute cette partie de l'Asie. Artemis était honorée à Ephèse, à Magnesie du Méandre, à Perga, et à Comana de Cuppadoce. Cette divinité avait deux temples fameux en Perse, l'un à Concobar, dont on voit encore les ruines, et l'autre dans l'Elymaïs, qui fut ruiné par Antiochus. Le Temple de Diane à Perga était situé sur la colline qui fut certainement le berceau de l'ancienne ville. Ses ruines ne consistent qu'en qulques murs de fondations et quelques fragmens sculptés, qui annoncent le beau temps de l'art grec. Il est probable qu'il fut ruiné par les Chrétiens lorsque la ville eut embrassée le Christianisme.

Les conquerants de l'Asie se rendirent tour à tour maîtres de Perga. Alexandre, marchant contre Darius, campa devant ses murailles; les habitants refusèrent d'abord de lui ouvrir leurs portes; mais une fois sa puissance perde anéantie, le roi de Macedonie devint tranquille possesseur de toute la Pamphylie.

Manlius, dans sa campagne contre les Galates, soumit et rançonna Perga; c'est la dernière fois que cette métropole fit un acte de ville libre. Sourmise aux rois grecs, et ensuite aux Romains, elle suivit le sort des autres villes de la contrée.

Mais peu d'années après ces événements, la ville de Perga devait acquérir un illustration plus durable parmi les nations chrétiennes. St. Paul après avoir quitté Antioche vint en compagnie de Barnabé (xx Acts xii, 13) " débarquer à Perga; cette ville n'était qu'à soixante stades (huit milles) de la mer. Il n'y sejourna point, et partit immédiatement pour prêcher la parole du Christ à Antioche, à Lystra, et à Derbé, où furent fondées les premières églises en Asie. A leur retour les Apôtres prêchèrent à Perga, et bientôt le christianisme se répandit dans la contrée. Plus tard Perga fut élevée au rang de métropole ecclésiastique; mais dans le VII^e^ siècle cette prérogative fut donnée à Syllæum, ville voisine. Les évêques de Perga disparaissent des notices ecclésiastiques sans qu'on puisse bien en expliquer la cause.

Un autre phénomène inexpliqué se manifeste dans les ruines mêmes de Perga. On n'y observe aucun monument postérieur au V^e^ siècle. Presque tous les monuments romains sont encore debout; ils ne sont ruinés que par l'effect du temps; les murailles sont encore debout. Il est évidence que cette ville fut abandonnée par sa population dans un espace de temps très limité. On n'y observe pas d'édifice qui date du moyen-âge, et encore moins de la domination musulmane.

Il est probable que c'est à cette cause d'abandon que le titre d'Evêché fut transporté à Syllæum.

Les Ruines de Perga.—Nous avons dit quelques mots du Temple, c'est le seul édifice qui soit antérieur à la domination romaine. La forme de la ville est celle d'un grand quadrilatère, appuyé au nord à la base de la colline. Les murailles sont conservées dans tout leur périmetre; elles sont baties en grands blocs de pierre, de taille et flanquées de tours quarrés de travail héllénique. Dans l'intérieur des murailles on remarque des casemates et de chemins couverts pour mettre les assiégés à l'arbri des attaques du dehors. On ne remarque pas de fossés ni d'ouvrages avancés comme dans certaines villes byzantines—Nicée, Orfa, et Constantinople, il n'y avait même point de fossé.

On entrait dans la ville par quatre portes, une à l'est, l'autre à l'ouest, et des deux autres au sud. Les portes de l'est et de l'ouest sont reliées par une grande rue, toute bordée de portiques et de bâtiments décorés de pilastres d'ordre Coriuthien. Dans quelques endroits ces bâtiments sont conservés jusqu'à la corniche. A droite du portique est un vaste édifice tout en pierres de taille, composé de grandes salles, bien éclairées, et dont la décoration intérieure consistait en peintures faites sur le stuc. La forme de cet édifice diffère de ce que nous pouvons observer dans d'autres ruines. Il est difficile d'en reconnaître la destination primitive, peut-être était-ce la Gerousia, salle d'assemblée du Sénat. Non loin de là est un monument orné de colonnes d'ordre dorique grec. Il se compose d'um atrium et d'une salle avec un hémicycle. C'était, sans doute, la Lesché (Λέσχη), comme il y en avait une à Delphes, où Polygnote avait peint des tableaux restés célèbres. Dans la partie sud de la ville sont les ruines d'une basilique, ornée de colonnes corinthiennes, et un édifice circulaire, flanqué de tours rondes, dont l'intérieur était décoré d'une colonnade en marbre blanc. Malheureusement les Turcs du village voisin, nommé Mourtana y ont établi une carrière pour faire des tombeaux avec les blocs de marble; ces tombeaux sont transportés à Adalia.

Outre les édifices que nous avons mentionnés l'intérieur de la ville contient d'innombrables débris de maisons, de portiques, et de ruines encore indéterminées; mais les inscriptions y sont très rares ou même presque nulles. Cela vient de l'usage où sont les Turcs de prendre ces pierres pour faire des tombeaux.

L'étendue de la ville ne dépasse pas 39 hectares de France, c'est environ 390,000 yards quarrés.

En y supposant une population de sept ou huit mille âmes on dépasse les limites de la densité des populations des villes antiques; cependant les deux monuments qui nous restent à décrire pouraient contenir une assistance, au moins triple, nous verrons à expliquer cette anomalie.

Le Théâtre, *Le Stade*.—Ces monuments sont situés dans la partie sud-ouest de la ville, et adossés à une colline qui ferme la plaine de ce côté. Le Théâtre est une des plus vastes monuments ne ce genre qui nous restent de l'antiquité. Le rayon ou la moité de son grand axe se décompose de la manirèe suivante (nous donnons ces dimensions en mètres français, il sera facile de les réduire en mesures anglaises):—

	m.	c.
Rayon de l'orchestre	20	46
Largeur du podium	2	19
Largeur de la première précinction	13	04
Podium de la deuxième précinction	2	20
Idem idem	1	04
Seconde précinction	10	98
Portique supérieur	6	29
Total du rayon	56	20

Ce qui donne un diamètre de 112m. 40c., plus de 300 pieds anglais. La première précinction a vingt-et-un rangs de gradins tous en place; la seconde précinction a dix-huit rangs de gradins tous en place. En prenant le developpement de tous les gradins on obtient les mesures suivantes:—

	m.
Première précinction—developpement des gradins	2898
Seconde précinction—developpement des gradins	3900
Total	6798

En attribuant 50 centimètres par place pour un spectateur, on trouve que 13,596 spectateurs pouvaient tenir à l'aise dans cette vaste enceinte. On ne comprend pas dans cette évaluation ni l'orchestre, où les Romains mettaient des spectateurs, ni les portiques supérieurs qui étaient reservés aux femmes.

Nous voyons, en effect, sur un des gradins de la précinction supérieure, l'inscription: ΙΕΡΕΙΑΣ ΑΡΤΕΜΙΔΟΣ (de la prêtresse Diane). C'était la place de la grande prêtresse du Temple qui avait droit d'assister aux représentations scéniques.

Les dégagements de ce vaste édifice étaient ménagés avec une rare intelligence. Une partie du monument étant assise sur la pente de la montagne, la foule pouvait arriver à la seconde précinction par le portique supérieur; elle descenait sur les gradins par dix-neuf petits escaliers, appelés par les les Grecs *parodi*, dont les marches était entaillées dans les gradins même.

Pour la première précinction. Il y avait deux corridors ou vomitoires, par lesquels on entrait du dehors; on pouvait aussi monter aux gradins par de petits escaliers qui communiquaient avec l'orchestre.

Dix petits escaliers ou *parodi* desservaient les vingt-et-un gradins.

Le portique supérieur était orné de soixante-dix colonnes de marbre blanc supportant les arcades.

Nous sommes forcés de passer sous silence une foule de détails de construction pour arriver à cette partie du Théâtre antique si importante et si rarement conservée. Nous voulons parler de la scène. La scène du Théâtre de Perga peut être considérée comme le reste le plus important de ce genre qui nous reste de toute l'antiquité. Elle est bâtie avec un luxe de matériaux inouï, et si la partie supérieure est écroulée on ne doit attribuer ce fait qu'à l'action d'un tremblement de terre. La scène a soixante-six mètres d longueur sur une largeur de quartorze. C'est cette partie que les anciens appelaient proscenium.

Derrière le proscénium, sur lequel se donnait la représentation, il existe une longue galerie voûtée, où se tenaient les acteurs : c'est la salle des mimes, ou parascénium. Au-dessous est une autre galerie pour les machines : c'est l'hyposcénium. La scène elle-même était en bois, couverte d'un plancher pour le jeu des décorations. La façade de ce vaste ensemble, ce que nous appelons le fond du théâtre, faisant face aux spectateurs, était décorée au rez de chaussée d'un ordre de pilastres de marbre blanc, supportant un riche entablement, et au premier étage d'un second ordre de colonnes ; au dessus était la couverture de la scène, formant comme un auvent au dessus des acteurs : c'est de cette partie de la scène qu'on faisait descentre les dieux et les génies, *Deus ex machina.* Pollux parle aussi d'une toile se mouvant sur des treuils, et qu'il appelle *katablema ;* c'était une toile de fond mobile, sur laquelle étaient peints soit des palais, des paysages ou des maisons ; elle s'élevait du fond de l'hyposcénium. Il y avait aussi des cylindres mobiles, dont parle Vitruve ; mais on voit combien cette description est défectueuse à côté de celle de Pollux.

Le chœur chez les Grecs se tenait dans l'orchestre autour du Thymélé, sorte d'autel élevé.

Les musiciens étaient à droite et à gauche, et quelquefois mêlés au chœur.

Tout le Théâtre était couvert par une grande toile, velarium qui mettait les spectateurs à l'abri du soleil. En un mot, chez les anciens la représentation scénique n'était ni moins variée ni moins splendide que chez les modernes.

Un modèle en relief d'un part, exécuté sur une grande dimension, pourrait sert donner une idée de tous les détails que renferme ce monument.

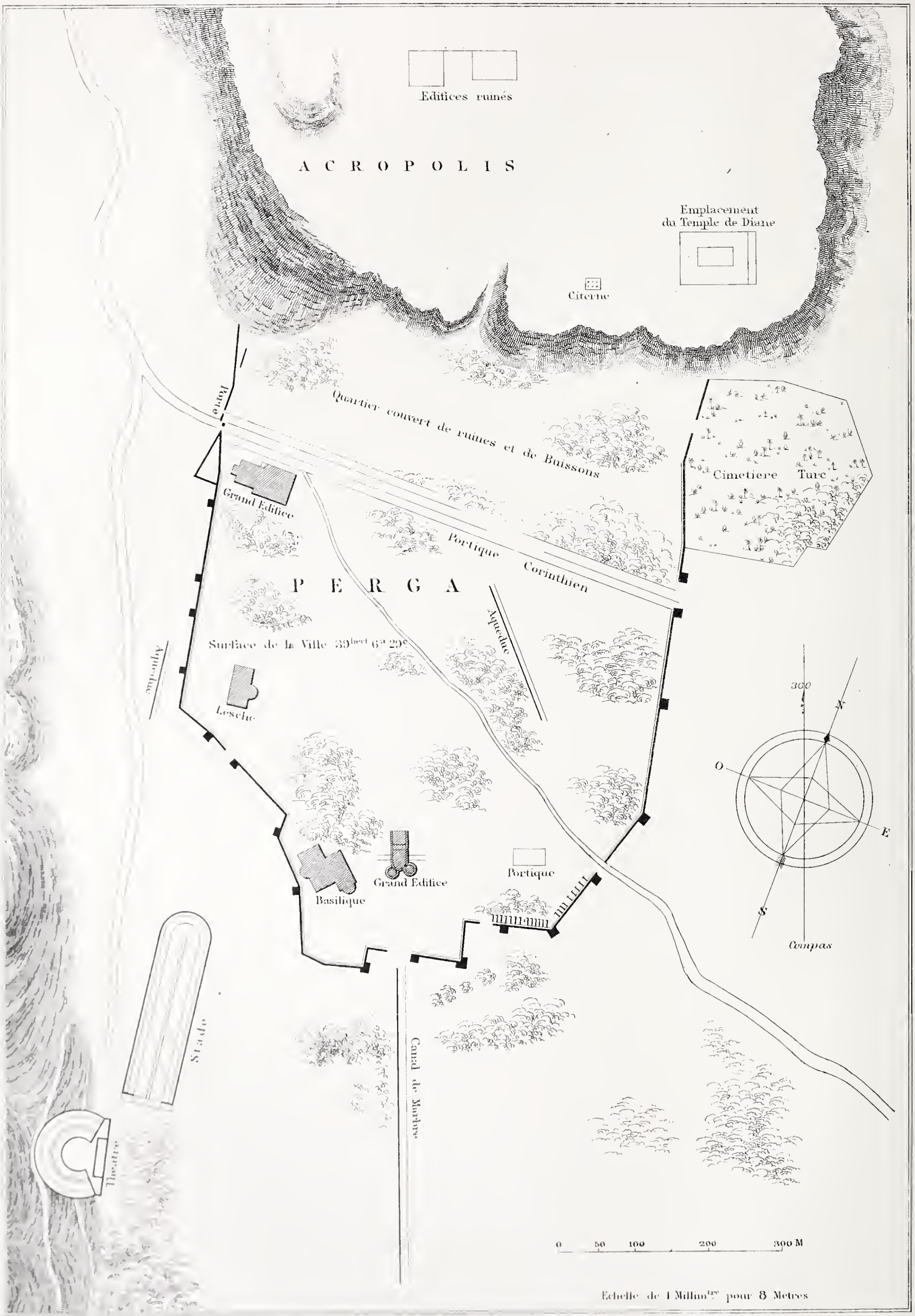
Le Stade est un monument beaucoup plus simple, et non moins bien conservé. Sa longuer est de 232m. 30c., et sa largeur de 36m. 30c. Il a treize rangs de gradins, et pouvait donner place à 10,670 spectateurs. On sait que toutes ces fêtes publiques étaient en rapport constant avec les cérémonies religieuses. Il est certain que les habitants des villes voisines y étaient conviés, car la population de Perga n'eut pas suffi pour remplir ces monuments.

La ville d'Aspendus voisine de Perga renferme des monuments qui ne sont pas moins dignes de fixer l'attention des érudits. Ce simple aperçu peut donner une idée des trésors d'antiquité qui existent dans cette partie peu connue de l'Asie Mineure.

The President, PROFESSOR DONALDSON, said M. Texier had been very kind in describing to them the monuments of that very interesting town. He had also called attention to several other places, and to the great number and extent of the monuments to be found in that country. The fact was, as it appeared to him, that Perga had been a sacred city, and that it was not so much for the enjoyment of the citizens themselves that these large edifices had been erected, as for the reception of visitors, at the times when the sacred games were held. At that period it was necessary to have large theatres to afford accommodation for the crowds who assembled on those occasions to witness the performances. Therefore, the mere size of the town was no measure of the importance of the place ; and the magnitude of the monuments afforded no comparison by which to judge of the size of the town. He did not know whether any gentleman present, who had travelled in Asia Minor, would be so good as to give them any observations on the subject. It certainly was very remarkable that there should be a theatre found with all the various parts and details so perfect as M. Texier had described.

Mr. R. P. PULLAN, Fellow, said that the most perfect theatre he had seen was that of Miletus, but in this the proscenium was destroyed. He believed that no other theatre existed so perfect as that of Perga, which M. Texier had so ably described.

The thanks of the Institute were then voted to M. Texier for his excellent address.



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Lithographed for the R I B A by Kell Bro^s.

LA VILLE ET L'ACROPOLE DE PERGA

EN PAMPHYLIE. ASIE MINEURE.

PERGA.—TOPOGRAPHIE DE LA VILLE.

Being a sequel to the Lecture delivered by M. CHARLES TEXIER, Hon. Fellow, at the Ordinary General Meeting of the Royal Institute of British Architects, May 18th, 1863. With a Plate of the Town.

Construction des Monuments.

LA ville de Perga est restée ignorée jusqu'à l'année 1836, on croyait même que ses ruines avaient complétement disparu. Plusieurs voyageurs notamment le Général Khoeler et M. de Corancez, qui avaient fait le voyage de Sidé à Adalia avaient longé la côte et n'avaient pas aperçu ces murailles. Les premiers renseignements sur leur existence me furent donnés par le Pacha d'Adalia en Août, 1836. Il y avait me dit-il d'importantes ruines au village de Mourtana à six heures de route (16 milles Anglais) à l'est d'Adalia. Le lendemain accompagné de gens de sa maison nous partimes pour visiter ces ruines.

A une heure de route, nous franchimes le fleuve Catarrhactès, aujourd'hui Douden, qui avant de se jeter à la mer s'épanche dans la plaine en de vastes marais sur lesquels on a construit une chaussée des pierres. Sur la rive gauche du fleuve le terrein s'élève insensiblement en formant quelques collines, c'est la ligne de partage des eaux du Catarrhactès et du Cestrus; tout ce territoire est aride et désert. Arrivés au sommet des collines après cinq heures de marche, nous découvrons une immense étendue de pays couvert de paturages, c'est la plaine de Pamphylie qui s'étend sans interruption jusqu'aux montagnes qui marquent le cours de l'Eurymédon. Des bouquets de verdure répandus de distance en distance indiquent les villages, mais ils sont désertés pendant l'été à cause de l'insalubrité de l'air, les habitans se retirent sur les pentes inférieures du Mont Taurus qui borde la plaine du côté du nord. Les collines au sommet desquelles nous étions se terminent à l'est d'une manière abrupte, presque verticale c'est un fait géologique assez remarquable.

Nous apercevons presque à nos pieds une grande ville dans laquelle s'élèvent de grands arbres, on croirait qu'elle renferme une nombreuse population, elle est entourée de hautes murailles blanches flanquées de tours ; mais, me disent les guides, cette ville est complétement déserte, on ne trouve des habitans qu'au village de Mourtana; c'est là que nous nous rendons directement. Le village est assis sur la pente d'une colline, il se compose d'une centaine d'habitations, et les voyageurs y trouvent des ressources suffisantes.

Au sud du village et au nord de la ville s'élève une montagne isolée, et de forme à peu près quarrée couronnée par un large plateau, son étendue n'a pas plus de 700 yards en tous sens ses flancs sont presque verticaux, on n'y arrive que par un chemin en zig-zag du côté du sud. Les murailles de la ville viennent s'amortir au pied de cette montagne qui était l'Acropôle, et qui par sa constitution offrait un moyen puissant de défense. Une petite rivière qui vient du nord passe au sud du village et contourne la montagne de l'Acropole du côté du nord, ce qui la rendait inattaquable de ce côté. Cette rivière n'est qu'un affluent du Cestrus qui coule a trois milles à l'est de la ville venant directement du nord. Cette rivière est large d'environ cent yards, elle n'est pas guéable une partie de l'année.

Comme nous n'avons trouvé dans ces ruines aucune inscription qui mentionne le nom de Perga, on se demandera peut être quelle certitude on peut avoir sur l'identité de cette ville.

Strabon dans sa description de la Pamphylie nomme successivement Attalia sur le Catarrhactès, Perga sur le Cestrus à soixante stades (sept milles et demi) de la côte, et Aspendus sur l'Eurymédon; il dit de plus que Perga était célèbre par son temple de Diane, enfin que Syllæum ville voisine était visible des hauteurs de Perga.

Ces trois conditions se trouvent remplies par la situation de ces ruines, on ne peut se tromper sur le nom du fleuve; un gradin du théâtre prouve qu'il y avait en cette ville une grande prêtresse de Diane enfin en montant sur l'Acropole on aperçoit à quatre milles de distance la ville de Syllæum aujourd'hui Hassar, qui a été visitée par le regrettable et savant M. Daniell (Travels in Lycia), et qui en a aussi constaté l'identité; on ne peut donc douter que nous n'ayons retrouvé la ville première étape de St. Paul quand il est venu convertir, nous pouvons dire conquérir, l'Asie Mineure.

La géologie de la contrée est digne de remarque. La formation de cette partie du Taurus appartient à l'étage du calcaire à nummulites, qui constitue une grande partie des montagnes de la côte et des îles. L'étage inférieur contient des gryphées et des hippurites. Les collines qui bordent la plaine de Perga à l'ouest sont d'une nature plus récente; la coupe verticale de la montagne met à découvert les tranches des couches géologiques de manière qu'on peut les lire comme les feuillets d'un livre.

La base est formée d'un banc puissant de calcaire grossier marin d'une contexture solide, et qui à été employé dans la construction des monuments de la ville. Sur ce banc repose un lit de grès calcaire (sand-stone), composé de sable quarzeux; il est subordonné à un banc de grès brun plus dur que le précédent, mais qui n'a pas d'homogénéité et qui n'a pas pu être employé dans les constructions. La nature de la colline change tout-à-coup. Sur le grès brun repose un banc très haut de brèche calcaire, formé d'un ciment calcaire marneux très solide, renfermant des fragmens de calcaire dont les angles sont aigus et les arêtes vives. Enfin la partie supérieure de la colline est composée d'un banc de poudingue, formé de petits cailloux de quarz et de calcaire arrondis, comme s'ils avaient été longtemps roulés par les eaux. C'est à n'en pas douter un terrein de sédiment déposé par les fleuve à une époque géologique ancienne. La montagne isolée d'Acropolis est composée de couches qui concordent assez régulièrement avec celles que nous avons décrites.

Maintenant à quel phénomène faut il attribuer cette falaise verticale que constitue les parois de la colline? Est-ce à un soulevèment subit des couches terrestres, où à l'érosion des eaux du Cestrus qui s'est ouvert une vallée entre les deux montagnes? Nous penchons vers ce dernier avis, les vallées d'érosion sont très nombreuses en Asie Mineure; la Lycie en offre un exemple bien marqué dans la rivière de Myra.

Dans le sud de la colline se trouve aussi un grand gisement de calcaire d'eau douce ou tuf de travertin qu'à été employé dans les monumens de Perga pour les remplissages des murs; ce tuf est de mauvaise qualité, mais il est remarquable pour sa légèreté.

Ces tufs d'eau douce se trouvent dans une autre montagne à deux milles au sud de la ville.

La ville est donc située dans une vallée, bornée au nord par la montagne de l'Acropole, à l'ouest par la chaîne de collines de Mourtana, et au sud par la colline de travertin; elle s'ouvre à l'est sur la grande plaine de Pamphylie où coule le Cestrus.

Il est à croire que dans l'antiquité la colline du sud donnait naissance à une source très abondante, qui avait été utilisée pour fournir à Perga de l'eau salubre, car un aqueduc qui prend naissance à cette montagne se dirige sur la ville. Les arcades sont couvertes d'épaisses couches de stalactites; toutes les eaux de cette contrée possédent au plus haut dégré la propriété incrustante.

Plan de la Ville et Observations sur les Monuments.

L'Acropolis.—Il faut croire que dans la dernière période de l'existence de la ville la surface de l'Acropolis a été tout à fait abandonnée comme étant d'un accès trop difficile, on n'y observe en effet aucun édifice debout, mais le terrein est couvert de fondations de murailles; ajoutons toutefois qu'on n'y trouve aucun vestige de constructions archaïques. Le plateau n'était pas entouré de murs; sa situation isolée présentait sans doute les conditions d'une défense suffisante. On y arrivait du côté du sud par le chemin taillé dans le roc dont nous avons parlé, on trouve en haut les traces d'une porte ou Propylée qui donnait accès dans la citadelle.

Le temple de Diane, dont les fondations sont encore apparentes, était situé à l'est; il est probable qu'il fut détruit sous l'empire Byzantin, peut-être sous Théodose qui fit raser un si grand nombre de temples. Ce monument ne nous est donc connu que par les médailles; nous trouvons une série de médailles de Perga, où le temple est représenté ayant au centre l'éffigie de la déese, sous la forme d'un cône ou d'une borne; le temple est tétrastyle. Cette médaille est du temps de Gordien (voir la collection du Musée Britannique), d'autres médailles de bronze représentent la déesse sous la même éffigie Mais il est d'autres médailles de Perga notamment un beau tétradrachme en argent qui représente la déese sous la forme connue de Diane chasseresse; dans le champ sont représentés le cerf et le griffon, attributs de la déesse. Il est certain que du temps de Cicéron Perga possédait une statue de Diane avec ces attributs, car Cicéron dans son plaidoyer contre Verrès lui dit: "Il y à Perga une statue de Diane très vénérée, vous avez dépouillé, Verrès, cette statue de tous ses ornements vous avez soustrait ses colliers d'or ses bracelets d'or." Comme la médaille de Gordien est d'une époque assez récente doit-on supposer qu'il y avait sur l'Acropole deux temples, l'un avec la figure archaïque de Diane, l'autre avec la forme humaine? les ruines ne permettent pas de decider cette question. Une autre médaille avec légende Cilicienne nous fait voir que le culte de la déesse était établi à Perga depuis la plus haute antiquité.

Le nom de Perga, comme celui de Pergame et du Pergama de Troie, vient de la racine Perg (*Pyrgos*), dont les Allemands ont fait Berg, montagne. Cette observation qui avait été faite par un philologue bien avant la découverte de la ville, s'est vérifiée par l'existence de la montagne de l'Acropole.

Les autres ruines qui se trouvent sur ce plateau ne sauraient présenter beaucoup d'intérêt. Il y avait au centre un grand édifice d'un construction médiocre, qui peut avoir été un palais, et plusieurs citernes; les eaux de la plaine ne pouvant arriver jusques-là.

Les Murs.—Si nous partons de l'angle sud ouest de l'Acropole pour faire le tour de la ville, nous arrivons bientôt à une porte aujourd'hui ruinée, mais qui ne présentait aucun caractère monumental, elle conduit à une grande rue qui traversait la ville de part en part jusqu'a la porte correspondante du côté de l'est. Les murailles se dirigent droit au sud, elles sont flanquées de tours quarrées, elles sont baties en moellons, et indiquent une époque voisine de la décadence.

Après un parcours d'environ 400 yards, dans lequel on rencontre huit tours quarrées; on arrive dans le voisinage du Stade et du Théâtre; quoique situés *extra muros* ces édifices étaient entourés de portiques et de monuments somptueux, dont on remarque les ruines. Ici les murailles se dirigent de l'ouest à l'est, elles sont défendues par quatre tours. Ce faubourg renfermait la Nécropole dont les sarcophages sont épars le long du chemin et de nombreuses maison d'habitation. Une grande rue alignée nord et sud est partagée dans toute sa longuer par un canal de marbre à fleur de terre; les margelles ont de distance en distance des têtes de lion, la gueule ouverte de sorte qu'en exhaussant les eaux du canal par un barrage, elles arrosaient la rue qui était sans doute bordée d'arbres.

L'extrémité des murailles se rattache à la face orientale de la ville, qui va droit au nord rejoindre la montagne de l'Acropole; cette face est défendue par cinq tours. Ces murailles paraissent dater de l'ère héllenique. Elles sont baties en grandes pierres de taille, dont les assises ont environ deux pieds de hauteur, la base est faite en blocs de poudingue, les assises sont en pierre calcaire.

Les tours dont plusieurs sont encore intactes jusqu'au sommet ont 7 mètres 10 centimètres de front, et autant d'épaisseur. Elles se composent d'un soubassement de dix-sept assises, environ neuf mètres de haut, à bossage rustique, et d'un étage de huit assises, qui dans l'intérieur forme un corps de garde, trois grandes fenêtres y sont ouvertes. Le soubassement est percé de meurtrières pour lancer les flèches. Ces tours ne sont pas couvertes en plate-formes comme à l'ordinaire, mais elles sont couronnées par un fronton formant un toit à deux pentes.

L'intérieur des murailles forme une suite de casemates où logeaient les soldats et les machines de guerre. La porte orientale de la ville n'offre pas d'autre ornement que deux tours massives. En général les habitans de Perga mirent peu de luxe dans la construction de leurs portes de ville.

La largeur de la ville de l'est à l'ouest est d'environ 620 mètres, sa longueur de 880 mètres ; cette surface avec tous les angles rentrans ou saillans donne à la ville *intra muros* une étendue de 39 hectares, 6 ares, 29 centiares.

Intérieur de la Ville.—La porte de l'ouest conduit directement à la grande rue des portiques, dont le parcours n'est interrompu que par des buissons et des colonnes abattues. Sur les deux faces de la rue s'élève une suite de bâtiments tous d'une architecture uniforme. Les façades se composent de grands pilastres d'ordre corinthien, espacés de 5 mètres 40 centimètres entre lesquels s'ouvre au rez de chaussée une porte ornée de chambranles et de consoles. Immédiatement au-dessus de la porte s'ouvre une fenêtre surmontée d'un fronton qui éclairait la salle du rez de chaussée. Cette salle avait toute la hauteur de l'ordre, c'est à dire environ huit mètres.

Au dessus des pilastres s'élève au second étage en attique, éclairé par des fenêtres plus petites. Tous les intervalles des pilastres ont la même disposition. On conçoit le bel ensemble que devait présenter cette rue dont les lignes d'architecture n'étaient interrompues que par l'ouverture des rues transversales.

La conservation de ces édifices est presque complète dans le centre de la ville, mais dans l'extrémité est ce n'est qu'un amas de décombres. Une grande quantité de colonnes de granit d'une petite dimension (5 ou 6 mètres) est éparse sur le terrain ; on ne saurait dire positivement comment elles se rattachaient aux édifices encore débout.

Le caractère de cette architecture et les sculptures des chapiteaux se rapportent tout à fait à l'ère des Antonins, ou peut-être d'Hadrien ; de grands ouvrages ont été exécutés dans les villes du Littoral par ces empereurs.

La Gérousie, ou Salle d'Assemblée du Sénat.—Nous connaissons les plans des Thermes, des Gymnases, des Temples, il est donc possible quand on retrouve un ancien édifice de pouvoir dire sur le champ s'il appartient à l'une de ces classes de monumens.

Près de la porte de l'ouest s'élève un vaste édifice, dont la largeur totale est de 40 mètres environ, et la largeur de plus de 60 mètres. Il est conservé dans toute sa hauteur, les voutes seules sont écroulées. Nous ne saurions dire quelle était sa destination, mais il est clair qu'il était affecté aux services civils. Il se compose de six grandes salles reliées entr'elles d'une manière irréguliere, et ne communiquant que par de petites portes.

La plus grande salle est un rectangle, qui a 12 mètres de long sur 26 mètres de large. La muraille d'un côté est ornée de niches quarrées, l'autre face est unie. On voit encore sur les murs les traces des stucs et des peintures. A gauche de cette salle sont trois autres salles parallèles, et de moindre dimension ; elles sont éclairées par de larges fenêtres, séparées en trois parties par des pilastres de pierre de taille, encore en place, et réunis par une architrave qui formait l'imposte de la voute.

Enfin à l'extremité du bâtiment est un autre salle, éclairée de la même manière, et contenant dans sa partie centrale une cellule voutée, une espèce d'oratoire ou de Sacellum.

On ne voit aucun ornement de marbre, le tout était bâti en grandes pierres de taille, et est encore d'une solidité à défier les siècles. On peut voir par cette description incomplète que cet édifice ne pouvait être autre chose qu'un magnifique palais, voilà pourquoi on peut supposer qu'il servait au conseil supérieur des citoyens. Nous avons omis de dire qu'à l'extérieur tout l'édifice s'élève sur un soubassement continu de pierres de taille, mais au dehors non plus on n'apperçoit aucune décoration architecturale. Ce monument est marqué au plan sous le titre de Grand Edifice.

Dans la première partie de cette notice nous avons parlé de la Lesché; sa position est marquée au plan. Les colonnes de ce monument sont d'ordre Dorique grec cannelé, mais c'est évidemment un ouvrage romain.

La Basilique.—Dans la partie sud de la ville est un autre groupe de monumens sur lequel on peut du moins hasarder des conjectures sans craindre de se tromper grandement.

Nous voyons d'abord une vaste nef, terminée par un hémicycle, à droite et à gauche de la nef sont disposées des niches quarrées; c'est bien la forme d'une basilique. On voit encore à une certaine hauteur les restes d'un riche entablement en marbre blanc, dont la frise est ornée de rinceaux. Les colonnes et les chapitaux corinthiens sont épars sur le sol; ils ont le caractère de la sculpture des Antonins. On ne saurait assigner à cet édifice une origine chrétienne. Attenant à la basilique sont deux grandes salles d'une architecture semblable à celles que nous avons décrites, éclairées de même par de larges fenêtres; c'est un caractère des monumens romains de cette ville. On conçoit, en effet, que dans ces pays brûlants il ait été nécessaire d'aërer les habitations.

C'est près de la basilique que s'élève ce singulier édifice dont nous avons dit quelques mots mais que nous n'avons pas observé assez en détail pour hasarder à son sujet même une conjecture. L'une des grandes tours circulaires qui en dependent en le plus haut monument de la ville. A l'extérieur est uu grand écusson, sur lequel est sculpté un bouclier; l'intérieur était décoré de colonnes et de revêtemens de marbre, qui vont tous les jours disparaissant.

Nous n'avons retrouvé dans la ville aucune trace certaine de l'Hospice de St. Michel bâti à Perga par ordre de Justinien en 533, et dont Procope fait mention dans son livre sur les Édifices. On le reconnaîtrait dans la masse de ruines qui avoisinent l'Aqueduc.

On voit que dans les ruines de Perga il manque deux élémens qui abondent dans certaines autres villes antiques: les inscriptions et les tombeaux. N'est ce pas une singularité dans le sort de certaines cités; à Myra, par exemple, les tombeaux se trouvent par centaines, et les vestiges de la ville ont à peu près disparu. A Perga on découvre à peine les fragmens de cinq ou six sarcophages sans que l'on puisse dire où a été s'engloutir cette nombreuse population qui a créé et habité tant d'édifices somptueux.

Perga a été pendant longtemps le siège d'un évêché, nous n'avons cependant observé aucune ruine d'Église, aucune inscription chrétienne comme on en trouve tant dans les villes de la côte; il s'en suit que l'abandon de cette ville, la cause de la désertion, pour ainsi dire, simultanée de ses habitans, restent encore un mystère. L'on peut ajouter que les ruines de Perga sont vouées à la solitude, l'insalubrité de l'air empêchera désormais une nouvelle population de s'y établir.

Mr. John P. Seddon, Honorary Secretary, then read the following paper:—

HEADS PLACED OVER ARCHES.

By Sir Gardner Wilkinson, F.R.S., Honorary Member.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, May 18th, 1863.

At the meeting of the Royal Institute of British Architects, held on the 1st of December, 1862, attention was particularly drawn by Mr. Street to the carved heads introduced as keystones in the arches of the church of St. Michael Penkevel,* in Cornwall; and in the paper which he read to the meeting on that occasion, the occurrence of the carved heads in that position, was noticed by him as "a most rare arrangement." Mr. Ashpitel also, in the course of the discussion, expressed his belief that the church was "of alien foundation; but Mr. White dissented from the latter opinion, considering the church to be the design of an English architect; and after stating that it presented a peculiarity almost unique, observed that there was "a most singular instance" of it "in the case of the ancient British or Irish church of St. Perran, or Pyran, at Perranzabuloe," built "about the year 470 or 480;" and that as this church had "in its arches heads introduced, very much in the same sort of way as that of St. Michael Penkevel," there "might have been in that part of the country some tradition of the kind, and this might be the only instance still left." Some, again, have considered the introduction of carved heads on the centre and sides of arches as a peculiarity derived from Ireland.

The arched doorway of St. Perran's, to which Mr. White alludes, has long since been destroyed; and the rude heads, preserved in the Truro Museum, are all that now remain to show its character. But, though unusual, the introduction of a human head over the centre of the arch, and another at each end of the dripstone, or hood-mould,† is not confined to the two buildings above mentioned, nor to churches of Ireland, or Cornwall; and two other very remarkable instances occur, one in the doorway of Tidmarsh church, near Pangbourne, in Berkshire, and the other at Rhôssili church, in Gower, South Wales; each doorway being the entrance to the church on the south side, with a porch before it of more recent time. They are both of late Norman style.‡ That of Tidmarsh is profusely ornamented, and is remarkable for having no columns or imposts, but a double hooded arch, with the mouldings continuing from the ground entirely round the head of the arch, and so disposed as to leave a flat space in place of the impost, with a corresponding projection of the mouldings in this part, and a similar projection over the human head that rises above the centre. The arch at Rhôssili has merely a double set of chevrons, and a moulding very nearly related to the so-called "crow's-foot" in the hood-mould; which may, perhaps, bring its date to about 1150, A.D.; and the arch springs from imposts on engaged columns. At the base of the archivolt of the inner archway is an indication of the early English style, in the moulding-termination and the chamfered edges of the doorway, but this may be a later embellishment of its originally rectangular face. At each end of the dripstone, or hood-mould, is a human head, and another at, or rather near, its centre; for it is very carelessly placed, and there is some appearance of the stones in that part having been thrown down, and put up again by later workmen less skilful than the original builders. Here, then, in Norman time, we have the central head, as well as those at the end of the dripstone; and whether the church of St. Perran, or Piranus, at Peranzabuloe, was of early British or Irish construction, there is no authority for supposing that the custom of introducing such heads originated in, or was brought to, this country from Ireland. Indeed, the introduction of an ornament at the summit of the arch, whereby the mouldings are compelled to abandon the curve of the archivolt, and to conform to the increased height of that ornament, was not confined to the fancies of British, or of Norman builders; a similar decoration occurs also in Saxon times, and some windows in the tower of Earl's Barton have a cross over their centre, which obliges the upper mouldings to rise over it; as they do at Tidmarsh over the head placed, in like manner, at the centre.

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* This name, doubtless the Celtic *Pen-ceffyl*, "horse's head," would have been curiously illustrated if one of the heads had been that of a "horse,"—(*Ceffyl*, the Latin *Caballus*.)

† I do not use the term label, as it should only be applied to a horizontal dripstone.

‡ Over a Norman doorway lately standing at the church of Findern, in Derbyshire, was a small full-length human figure at each end of the hood.—(*v.* Reliquary of April, 1863, p. 191.)

But the most striking instances of the introduction of carved heads as ornaments in the centre, and at the sides of arches, are found in early Etruscan buildings, particularly on the arched gate called *Porta del arco*, at Volterra, and on that sculptured on one of the ash-chests found in a tomb at the same place. On this last is recorded the death of Capaneus, who, while scaling the Ogygian Gate at Thebes with a ladder, was struck by lightning; and it has been supposed that the identical "*Porta del arco*," above mentioned, is thereby intended. But, in justice to the sculptor, it is only fair to suppose that, if he had wished to represent it, he would have made a more correct likeness of the entrance to his native city, and it is therefore more reasonable to suppose that he merely gave the *general character* of an Etruscan gate, rather than a particular one to which it bears no very exact resemblance, beyond the fact of its being ornamented with three heads. This was a common feature; and in the elaborately ornamented gate of Perugia we have again the three heads, though arranged rather differently, one being in the centre, and the other two in the spandrils of the arch; while above, in lieu of frieze, is a row of pillars, or square columns, and each of the three central intercoluminations is occupied by the figure of a man, and those at the two ends by the forepart of a horse.* Sometimes the heads above the imposts were omitted in Etruscan arches, and the central one was alone introduced rising above the line of the uppermost mouldings of the archivolt, as at the gate of Falerii; and sometimes this central head was merely placed on the keystone, as at the *Porta del Bove* at the same Etruscan city and elsewhere, being then similar to the ordinary arrangement over Roman arches. But in these last the central head, or a full-length human figure, frequently rose *above* the level of the uppermost moulding, or hood mould, as in some arches of triumph, at the so-called "Gate of Janus," at Rome, and on other buildings; various devices were also introduced on the keystone of Roman arches, as over the gate of Zaghwan in the Regency of Tunis, where a circle containing an inscription is placed above the head of a ram, and is crowned by a large A; and other Roman arches have the simple head on the keystone; which has been so largely copied throughout Europe in later times, and introduced over the doors of public and private buildings.

There is also an instance of a head placed immediately over the keystone, and above the archivolt, at a double gateway of the time of Augustus, at Nismes; and the arch of Rimini, besides the central head on the keystone has one at each side of the arch in the spandrils, as in the above-mentioned Etruscan gate of Perugia, but arranged in the form of medallions. Sometimes, however, the Etruscans omitted the central device, and introduced it only into the spandrils; and the same arrangement is followed over the gate called "of Augustus," at Perugia, which is either Etruscan or an imitation of that style; and even the common custom of placing figures in the spandrils of Roman arches may be derived from the Etruscans, though they were not answerable for the graceless and cramped positions to which the Romans sometimes condemned their winged announcers of victory, in those uncomfortable corners above their triumphal archways.

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* The custom of ornamenting with heads, or, as they have sometimes been called *larvæ* ("masks") was peculiarly Etruscan, as is shown by their vases, knobs, handles of utensils, and other objects.

The decoration of spandrils and other parts of the walls in some of the Mediæval (Lombard and other) towers* at Rome and elsewhere was derived from the old custom so long prevalent in Italy, and in some of these we even observe projecting brackets at the end of each hood-mould, looking like the representatives of the heads that used to hold that position in former times. It is, therefore, not surprising that the early churches of Italy should offer instances of the introduction of heads, or the figures of saints, and other devices on the imposts, and in the spandrils of arches. They occur at various places: as over the side door of the church of San Pietro at Spoleto, where the hood-mould springs from an eagle; at the central door of St. Maria at Toscanella, where a griffin stands on a column at each end of the arch; at the doorway of the west end of San Quirico, where a grotesque human head takes the place of the impost at each side; and at the door of the Cathedral of Bitonto, near Bari, where both the central and terminal ornaments of the arch are animals.

I may also mention instances of the introduction of medallions with busts in the spandrils, over arches springing from columns: at St. Apollinare nuovo in Ravenna (about A.D. 554); and others in the mosaics of San Vitale at the same place, of about the same date; and the much later examples at the Cathedral of Monza; at the Foro dei Mercanti at Bologna; at the Church of San Francesco, at Rimini, of 1450, A.D., evidently copied from the Roman arch above-mentioned; and the angels in the spandrils of the Baptistery at Parma, of Lombard style, built about 1196; which with numerous others, show how their architects borrowed a mode of decoration from earlier Roman monuments.

For this, as for so many of their customs, the Romans themselves were indebted to the Etruscans. Nor were the Roman architects singular in this imitative habit; and imitative as architecture has so often been, we might reasonably expect them to borrow a mode of ornamenting arches from their instructors the Etruscans. And it is scarcely necessary to observe that the old notion of our infancy, which led us to believe the arch a Roman invention, has long since been discarded, and that the Assyrians, Egyptians, Etruscans, Latins, and others, used the arch long before its adoption at Rome.

The same habit of borrowing from a predecessor led, no doubt, to the introduction of the heads in arches of later times; and we may safely ascribe it to the same source from which proceeded all the various styles of early Christian times: the Roman, which had before, in its turn, derived it from Etruria, and modified it in various ways, according to fancy or convenience.

Nor was the influence of that peculiar ornament confined to those people who directly copied and adopted it; and we may even trace it in another style of architecture, which differed very widely in the use of such ornaments from its Pagan predecessor. The Arabs, as is well known, were forbidden by their religion to introduce the human form into their ornamentation; but the idea of decorating the summit and the spandrils of arches was not the less derived from Roman architecture; and we may trace the circular wreath, or the medallion on some occasions, and on others a substitute for the human head of the spandrils in the projecting boss of their doorways; where, too, the highly decorated centre presents a well known Byzantine ornament.

It is not necessary to look to Ireland for the origin of this custom of introducing carved heads over arches in any of our early churches; even if it could be proved that the small sanctuary of St. Perran was actually indebted to Irish influence for its character; and indeed their occurrence in that country is not so common as to justify the notion of the custom being peculiar to Ireland, for, as far as I can learn, only two examples are there met with,* one in the round tower of Donaghmore, Co. Meath, which has a head at each side of the hood-mould, with a figure of the crucified Saviour over the centre; and the other in an arched porch before the church of Freshford, or Achadhur, Co. Kilkenny, where on the keystone is a head, and at each side of the lower part of the hood-mould a figure; the porch itself being of Romanesque style, very similar to our Norman, though probably, as Mr. Petrie supposes, of a date anterior to the Norman Conquest.

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* The capital of the shaft supporting these two arches in the tower is very similar to the capitals in some of our Saxon church towers, and of about the same date.

The custom was, no doubt, borrowed by the Irish builders from the same source, as by those who introduced it into England; the same habit of borrowing from the monuments of Roman time influenced them in this as in other particulars; and we may safely ascribe this fanciful ornament to the same origin, as the alternate courses of red and white stone adopted by the Normans, the Arabs, and other people, as well as the arch itself, which came to Ireland, England, and other Christian countries from our Roman predecessors.

It is true that certain people borrow and adopt one, others a different, feature from an earlier style: and if confined to, or common in, Ireland, this custom of placing carved heads over arches might be looked upon as an Irish peculiarity; but such is not the case, and in fact more instances of it occur in England than in the sister island. We do not ascribe the heads at the end of dripstones, so common over doors and windows of the so-called Gothic architecture in England, France and Germany to Irish influence; and if these head ornaments are conjectured by others to have been introduced into England from a foreign source, this can only be true so far—that all the different styles of European architecture are cognate in origin, and come from one common parent.

To trace the source of all ornamental devices, and the different modifications they have undergone, would be a very curious inquiry; and the early progress and history of the zigzag moulding alone might serve to illustrate the various phases through which a simple ornament may pass, from its first occurrence in Egypt, to its adoption by the early Greeks, and in later times to its appearance as an architectural device on Roman buildings (as throughout the palace of Diocletian at Spalatro) and afterwards to its adoption by the Normans, who, by judicious adaptation, succeeded in making it their own, and derived from it various other combinations which became distinct ornaments. The same process may be traced in other instances; and those two well known devices, the scroll and the so-called Tuscan border, fret or labyrinth, both which are of the earliest date, are in fact only two different expressions of the same idea, one taking the circular involuted, the other the rectangular interlinear form. The adoption of the latter in Egypt, China, Mexico and other countries serves to show how minds sometimes arrive at the same idea in the most distant regions, independantly of all communication with each other; as the ancient Britons, and other untutored people, adorned their vases with hatches, zigzags, lozenges and horizontal lines, through the instinctive and primitive notions that prevail during the infancy of man. But even devices such as these, when improved by nations more advanced in art, become a part of their peculiar ornamentation, as the early zigzag became in time the Norman chevron.

There are, however, certain conventional devices which can be positively traced to some known origin, and which belong unquestionably to a particular people; and this leads to another very important question—that of *types*—which is of equal interest and extent with that of the *first elements of ornament*. But both these enquiries would demand a lengthened and minute investigation, with the most ample illustrations; and such a work would be an undertaking worthy of some member of the Royal Institute of British Architects, and an interesting companion to Mr. Owen Jones' Grammar, and Mr. Wornum's Analysis, of Ornament.

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* See Petrie's excellent work on the "Round Towers of Ireland" p. 410 and 285.

Mr. **Seddon**, Hon. Sec., on concluding the above paper, remarked that he had found that another instance of a Norman doorway with three heads, in similar positions, at Nately, in Hampshire, was illustrated in Plate I. in Mr. R. Brandon's " Analysis of Gothic Architecture."

Mr. **White**, Fellow, explained, with reference to the doorway of the Oratory of S. Piran, at Perranzabuloe, that it was not in a drip-stone that the heads were introduced, but in an independent manner, as the key of a rough arch, without a dripstone of any sort. He believed that the head of the doorway in the round tower of Dromore, in which the crucifixion was carved in relief, was in one large block of stone, much larger than the rest of the walling, and that that was without a dripstone; or if it had one, it was of a very flat description, formed in the large mass of stone. One word with reference to the influence of the Irish upon the early architecture of Cornwall. S. Piran, and many others about the fifth century, are known to have come from Ireland, settled in Cornwall, and built their oratories or churches. He was but one of many who did so, and this was accredited both historically and traditionally the fact.

Mr. **Street**, Fellow, was very glad the observations he happened to make about the church of St. Michael Penkevel, had led to the remarks of Sir Gardner Wilkinson. He thought, however, that the carved heads which occurred there were merely the result of the personal whim or caprice of the particular architect, and nothing more. In almost all the cases to which Sir G. Wilkinson had directed their attention, the arches were semicircular; and as long as they had round arches, it was a perfectly natural thing for the old architects to mark their keystones. But there was no reason whatever for marking the centre of a pointed arch; and indeed almost all the best pointed arches had a joint in the centre, instead of a keystone. So that what he held was that in this church the introduction of this unusual feature was an example of one of those eccentricities which architects in all ages occasionally indulged in. If some other church of the same age had been found in the same district, presenting the same peculiarity, he should have held it to be fair evidence of the works being done by the same architect. But this was not the case. He did not think that many would suppose that the architect of St. Michael Penkevel had in his mind, as Mr. White suggested, anything like the church of S. Piran—the two buildings being utterly unlike, both in the mode of design and in the work itself.

Mr. **Parker**, Hon. Mem., was sorry to be obliged to differ on the subject of these heads in S. Piran, at Perranzabuloe. When he saw them some time ago, he fancied they had been independent of any moulding; but, upon re-examining them last summer, he found that they had mouldings attached to them. As they lay in the museum, any one who took the trouble to go round and examine them on all sides, would find the section of the moulding attached to them. He must confess some surprise at hearing so much said about these heads, inasmuch as they seemed to be not at all unusual things. He had seen, he might say, hundreds of them in the churches of Henry the Second's time, and they were by no means uncommon. He should doubt very much the antiquity of the sculpture referred to. The work is so exceedingly rough, that it may have been built at any time. On first examining it, it certainly did appear more ancient; but on a second careful examination, he felt convinced it was the work of the 12th century, corresponding as it did with so many examples of that period.

Mr. **Ferrey**, Fellow, said that it appeared to him that keystones, such as those described, and another to which his attention had been called, at Clive Church, Shrewsbury, were introduced principally during times of rebuilding when, either from caprice or some fancy, the builder had taken a curious stone and placed it in the structure, in a position which would give it prominence. He (Mr. Ferrey) had seen pointed arches, where keystones had been put in in this sort of capricious manner.

Thanks were then given to Sir Gardner Wilkinson for his paper.

Mr. T. Hayter Lewis, Fellow, then read the following paper :—

A FEW NOTES ON SOME POLYCHROMATIC CONSTRUCTION AT ASTON CHURCH.

By Mathew Ellison Hadfield, Fellow.

This church, in the Deanery of Doncaster and Archdiocese of York, is situate about nine miles south-east of Sheffield. It was one of the many fees of the Norman De Lovetot, the founder of the Abbey at Worksop, and as he gave Aston to his daughter Maud, it is probable that either he or she were the builders of the church. William De Lovetot died in 1180 A.D. The arcade of the nave, which forms the subject of these remarks, bears undoubted evidence of the style then prevailing, whilst the very remarkable resemblance of many details to those of Worksop Church leads to the inference that it may probably have been the work of the same builder.

In the autumn of last year the present Rector, the Rev. A. R. Campbell, determined upon a general restoration of the church, and this circumstance has led to the uncovering of the Norman arcade which separates the nave from the aisles. It had been covered by a thick coat of plaster; the hood moulds, capitals, and even the shafts had been defaced, and disfigured by modern mouldings in plaster. In the process of restoration it was discovered that the arches were constructed of differently colored stones, so systematically arranged as to leave no doubt that it had been designedly done to give the grace and force of color to the otherwise simple mouldings. The tints of the three rims of the arches are different in color and texture. The hood mould[*] is of purple gritstone from the neighbouring village of Wales, the outer chamfer is of red sandstone from the same place, whilst the inner rim and relieving arches are of the rich yellow limestone from Lindrick Common, near Worksop. The shafts are built of each kind of stone, one capital only is of Roche Abbey limestone, with an abacus of Anston stone, and is of a very beautiful form.

The church generally partakes of three different styles, but there is nothing particularly worthy of note except this very striking and (so far as Mr. Hadfield's experience of English work of the period) unique arrangement of colored bands in the arcade.

Great care has been taken to preserve this remarkable feature of the building, and the capitals, bases, and other details have been carefully restored. In restoring the plain ashlar of the walls the thick projecting pointing has been used with very good effect; no renovation of the old work has been permitted except carefully washing and scrubbing the surface, the practice, so much to be condemned, of chiselling over old stone to make it look new having been strictly prohibited.

The old altar stone, a very fine specimen of the period, has been discovered and placed in the vestry; it measures 8 ft. by 2 ft. 5 in. by 8 in. thick, and has a bold hollow chamfer on the ends and front; the consecration crosses are discernible, though much worn.

Mr. G. E. Street, Fellow, remarked that the arcade presented some curious features. It seemed to him that the arches must have been taken down and rebuilt on the old Romanesque columns, as they did not fit the capitals, and as the way in which the colored materials were used differed in the columns and arches. In the latter, each order of the arch was of different color, whereas in the columns the colors of the alternate stones were varied in the common fashion.

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[*] This hood mould curiously enough is of the same character as the late decorated work in the church.

Mr. Seddon, Hon. Sec., said that Mr. Hadfield, Junior, had told him that the walling above at least one of the arcades was Norman, as evidenced by its style of masonry and pointing, whence it would appear that the arcade itself must be Norman. Still it was strange how the decorated label could have been inserted.

Mr. Lewis, Fellow, stated that he had also seen Mr. Hadfield on the subject, who stated that he had paid much attention to the Norman construction of walls, and believed the arches to be those built when the columns were first erected. Also, that the church contains work of the fourteenth and fifteenth centuries, the different modes of construction in which is obvious enough, and the division, particularly in the aisle of the north wall, is plainly marked.

Mr. Street, Fellow, remarked further that they would constantly find in old works that the arcades were rebuilt without the wall above the arches being taken out. Cuddeston Church and Tackley Church were examples; the Norman clerestory in both cases being carried on thirteenth century arches.

The thanks of the meeting were then voted to Mr. Hadfield for his paper.

The President, Professor Donaldson, proceeded to make the following remarks upon

THE TRIBUNAL DE COMMERCE, PARIS,

Mons. Alex. Bailly, Architect.

This building designed by M. Bailly, and shown on the plans, sections, and elevations (which were exhibited), is situate on the Quai Desaix, at Paris, where it intersects the Boulevard Sebastopol. It has been the firm determination of the Emperor, despite any obstructions or costliness of execution, to carry the main lines of communication in a straight direction, diverging neither to the right nor to the left; and although there was a very handsome and substantial bridge within a hundred yards of the direct course of the Boulevard Sebastopol, he would allow no motive of economy to interfere with his principle of planning, but directed the existing bridge to be pulled down and rebuilt of a proper width on the axis of the Boulevard.

The Tribunal de Commerce, especially set apart for all cases relating to trades, manufactures, and commerce, is a speciality which does not exist in this country, for although there is a Chamber of Commerce at Liverpool, and I believe at some other of our great seaports, yet their arrangements and decisions have no general legal effect, and have not the validity of a court of law, as is the case with the Tribunal de Commerce. The building occupies an area of 233 ft. by 190 ft., and has two interior courts respectively 79 ft. by 57 ft. 6 in. and 40 ft. 6 in. by 29 ft. 6 in.; the larger one being covered by a glass roof. It has streets or quays on the four sides, on three of which there are divisions for twelve or fourteen shops, the larger ones of which are 28 ft. by 18 ft., the smaller ones 22 ft. by 16 ft. 6 in. The ground floor also presents two large vestibules, 80 ft. long, and respectively 46 ft. and 24 ft. 6 in. wide. There is a hall for the trade marks, 74 ft. 9 in. by 16 ft. 6 in.; a room for references, 40 ft. by 25 ft.; a hall of audience of the prudhommes, 57 ft. 6 in. by 46 ft.; a council-room, 36 ft. by 24 ft. 6 in.; a witness-room, 27 ft. by 24 ft. 6 in.; and various clerks' offices. On the axis of the front, next to the Boulevard of Sebastopol, is the grand octagonal staircase, 41 ft. 6 in. diameter in the clear, and surmounted by a lofty dome, which will be one of the most important features, as Paris is somewhat deficient in such objects, rising above the general line of the roofs of public and private buildings. On the first or principal floor are the courts of justice, as those of bankruptcy, 50 ft. 6 in. by 45 ft. 6 in. and 53 ft. by 27 ft.; the great court of commerce, 52 ft. by 45 ft.; the council hall, 40 ft. by 25 ft. 6. There are three ample waiting halls, one of which is 79 ft. by 23, and two 45 ft. by 29 ft. 6 in. There are also rooms for the president and his secretary, for the judges, and for consultations and references, clerks' offices, and library for the solicitors. With respect to the elevations, it may be observed that the style of architecture is of the Renaissance period, the height of each of the two stories being 30 ft. 6 in., with a metal parapet, 3 ft. high, richly decorated. There is a tier of very handsome dormer-windows in the roof, which rise about 10 ft. 6 in. above the parapet, giving a total height to the tops of the dormers of about 75 ft. The general effect of the fronts is very imposing, from the grand scale of the building, and from the columns, pilasters, bas-reliefs, and other decorations which cover the whole surface. The estimated cost would seem to be about £200,000, half of which is to be defrayed by the city, the other half by the department. Instituting the comparison between the Tribunal de Commerce and our Royal Exchange, which are very nearly of the same size; the covered area of the Tribunal, exclusive of the courts, is 38,647 ft., that of the Exchange, without the court, being about 36,000 ft., the structural cost of the latter was £125,000.

Mr. DONALDSON concluded by observing that it would be presumptuous in him in such an assembly to enlarge upon the skilful arrangement of the plans, or upon the taste and elegance, with which M. Bailly had carried out the decorations of the several façades: he would, however, notice one point of practical interest, which was that, in addition to the bills of quantities furnished to the builders, who intended to compete for the execution of a building, it was usual at Paris to supply them with a set of plans, elevations and sections lithographed in outline for the purpose of enabling them the better to judge of the nature of the work they were to execute. He should state that M. Bailly had most kindly sent him the large lithographs, which he (Mr. Donaldson) had had tinted, in order the better to explain the whole building.

Mr. SPIERS, Associate, stated it to be the impression at Paris, that M. Bailly's attention had been drawn to the Town Hall at Brescia, which to a certain degree he had adopted, but had modified so as to suit his own tastes and impressions.

A question having been asked, as to the professional remuneration usually paid to architects at Paris, M. TEXIER being referred to stated, that it was variable and not precisely fixed, private individuals paying five per cent., the government three or even two per cent. according to the nature and extent of the building, in fact as little as possible.

A vote of thanks was unanimously passed to M. Bailly for having so obligingly furnished the plans, elevations, sections, and other details to enable Mr. Donaldson to explain his interesting and noble building to the Institute, and to the Professor himself for the remarks he had made thereon.

The meeting was then adjourned.

ON THE PRINCIPLES TO BE OBSERVED, AND THE PROCESSES EMPLOYED, IN THE DECORATION OF CHURCHES.

By William Lightly, Associate.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, June 1st, 1863.

My theme this evening is the decoration of churches, a subject involving the consideration of abstract principles, as well as of practical details. I have therefore arranged my remarks under two heads—the theoretical and the practical. Under the first I shall have occasion to notice those principles which obtain in all good decoration, ecclesiastical as well as secular, and also some others which apply more especially to the decoration of buildings devoted exclusively to the offices of religion. Having under this head pointed out a few of the principles which should guide us in the choice and arrangement of our materials, I shall proceed to consider, under the second, the nature and qualities of some of those materials, and the position and manner in which they may be best employed. In the two works which I regard as the most valuable we possess on this subject—Mr. Field's "Chromatography," and Mr. Owen Jones's "Treatise on Color in the Decorative Arts,"—it is laid down as a rule that in decoration the various colors should be so blended, that the objects colored, when viewed at a distance, should present a neutralised bloom; and, furthermore, that this neutralised bloom is to be obtained only by the use of the primary colors—yellow, red, and blue, in the proportions of 3, 5, and 8.

The fact of the neutrality of this combination of colors, and the desirability of obtaining a bloom of color, I quite admit; but, from the axiom that this bloom should be neutral in all buildings, to whatever purpose applied, and equally in all parts of a building, I must venture to dissent. To nature, by which term, I presume, landscape in this case is meant, we are referred as to indisputable evidence of the correctness of the axiom; but I confess that hitherto I have failed to discover this unvarying neutrality in nature. In high latitudes neutral grey is undoubtedly the color prevailing throughout nature; but how is it in the east and south? how of tropical nature? how of the blue Mediterranean? how of the yellow plains of Egypt and Syria, "shining like leaves of gold from nature's book, by nature's God unrolled:" How of the Campagna of Rome, purple and russet in the setting sun? or the Alps and Apennines, glowing red in his glory? How of the temples at Pæstum, at mid-day, lovely in the gold and blue applied so lavishly by the hands of time and nature? Or even to look around us, How of our own woods and fields, in the beautiful springtide tender green or white with flower, black in the leafy month of June, red and golden yellow in autumn? A bloom there undoubtedly is of soft grey or delicate blue, the gauzy veil of atmosphere spread over all alike, more or less; but the tone of each is different, often very decided, being derived from the predominant local color, and varying with the seasons and even the hours. So that taking Dame Nature for our guide, as most surely we should do, we may still decorate our buildings in something more than mere neutral colors—especially large churches, where the lofty vaults and long-drawn aisles will give to some extent that bloom of atmosphere which so enhances the loveliness of landscape; and John Bull in his castle may, without fear of acting on bad or wrong principles, indulge his rather favourite weakness for a blue room, a green room, or a pink room, &c. But there is more than this to be learnt from the coloring of landscape. The very variation of the colors with the seasons points out how we should adapt the coloring of our buildings to the circumstances under which they will be used. In the hopeful springtide our eyes are gladdened with the brightest and freshest tints of green. As the summer flowers, sparkling with a thousand brilliant hues of yellow and purple and crimson, make their appearance, the bright greens of spring are toned down into a quiet neutral background. To summer succeeds autumn, when Nature appears in colors of the richest though most solemn tones, at times solemn almost to sadness. The Japanese, who are great students of Nature, have learnt well the summer lesson; for in a lecture given the other day at the Architectural Exhibition, Dr. Dresser drew attention to the fact, that though commonly using the brightest colors in their works of art, manufactures, &c., they invariably make their wall-papers dull and neutral, clearly showing that they consider that the proper treatment for the walls of an ordinary dwelling room is as a background to enhance and make more attractive the beauty of the furniture, and likewise, he added, of the occupants, of the room. This is just what Nature does for the flowers in summer.

Here, however, and before I proceed to point the moral of the autumn coloring, I will call your attention to a fact bearing with considerable importance on the subject before us—viz., that though the Japanese are perfectly right in treating the walls of dwelling rooms as mere neutral backgrounds, to the bright objects and persons filling them, yet it is a very different thing when we are engaged in the decoration of a church. Then the question is not how to make a background to gay persons or things, but how best to adorn and make beautiful the fabric of God's house. As the ends are opposite, so must the treatment be. Instead of covering the walls with neutral diapers in common material, we must decorate them with works of art of the most noble style, and in the best material that our means will command—preferring always what is good of a lower order of work or material, to what is bad of a higher. If we cannot afford good pictures in fresco, let us have good ornament in distemper; if we cannot afford marble or glass mosaic, let us have stone and brick or tile, but always of the very best quality. With regard to the observation that autumn colors are adapted to the graver tone of mind often experienced at that season of the year, it may be objected that the solemnity of the colors is partly the cause of the feeling. Be it so. Either way I draw from it the argument that the colors used in decorating a building set apart for the most solemn thoughts and ceremonies, should themselves be rich and solemn in tone.

It is now, I apprehend, pretty generally admitted that no architecture can be perfect until adorned with color—the term architecture being understood to mean regularly designed architectural works, in which the various necessary features, as doors, windows, arcades, &c., have each separately their full value and importance given to them, while at the same time they all combine to form one complete architectural composition—the colored decorations being employed to enrich and adorn the architecture, to emphasize important features, and to increase the general beauty of the whole. The term, therefore, does not include buildings consisting of four walls and a roof, devoid of architectural design, and erected solely for the exhibition of pictures, as the Arena Chapel at Padua, which, much as I admire the beautiful frescoes of Giotto, I cannot regard as a specimen of decorated architecture.

Moldings in an architectural design have special functions to perform. They are decorations used to give force and feeling to the most important features of the construction, as the arcades, doors, windows, groining, &c. All colored decorations, therefore, which are applied to them should be such as will mark more forcibly this their distinctive character, and should not be allowed in any way to interfere with their forms. When windows, doors, &c., occur in a wall or other plain surface that is decorated with pictures or diapers, the pictures must be adapted to the shape of the spaces to be covered, and the diaper spread over the wall without any attempt to arrange or fit it to the form of the window, &c.; in short, the decoration must be kept quite subservient to the architectural forms. To give the full value to decoration, there should always be spaces of considerable area left in plain flat color, or treated in so quiet a manner as to afford relief and rest to the eye. One of the principal objects of decoration is to enhance the beauty of the material to which it is applied, and by its style to indicate what that material is; but to employ decoration, to make one material look like another, is an abuse, and not a legitimate use of it. Stonework, therefore, should be left its natural color, not painted over, though patterns may be painted on it. No carving or sculpture should be colored, though the stone or marble in which it is wrought may be of any natural tint, the lighter colors being the best, as giving more value to the delicate lines and shadows. But I see no objection to covering the ground with diaper in gold or color.

Color may, and I believe does, exercise on the mind of the beholder an influence akin to, if not as strong as, that of music. As music may be either solemn or joyous, or even frivolous, so may color; and the effect produced by either will correspond with its character. Therefore in the decoration of a building where the most solemn religious services are performed, the treatment of the colored decorations must be of the gravest, the purest, and the most refined; there must be nought to distract our attention, nought to remind of the busy mart, of places dedicated to pleasure, nor even of the familiar ornamentation of our homes. The decorations must be as rich and magnificent as we can make them, but of a grave and solemn character withal. We all know that certain arrangements of form, certain combinations of color, nay certain colors themselves, though perhaps not unpleasing are decidedly meretricious. These, though they may be pardoned in buildings used for less solemn purposes, become positively offensive in a church, and must be rigidly excluded, as also everything that is fictitious or tawdry, or that in any way approaches in character to a sham. Simplicity and breadth of general effect, combined with richness of detail, should be our aim. A tinselly or "clinquant" effect must be carefully guarded against.

As in nature, all those objects which are of a strong or massive character—e.g. rocks, trees, the larger animals, &c.—are low in tone of colour, and only the smaller or more ornamental ones—e.g. birds, flowers, fruit, lichens, precious stones, &c.—are of bright positive colours; so low and subdued colors—colors resembling in tone, as nearly as may be, those of natural stones and marbles—are most satisfactory in the broader masses of architectural decoration, where they will serve as a ground for more brilliant and positive colors applied in small quantities or patterns.

The general effect of decoration should always be quiet and subdued; but in preparing our designs, allowance must be made for the inevitable toning down of time and wear, and also for accidental effects—as, for instance, light reflected from the floor to the walls and roof. In large buildings the atmosphere also will tone the colors down to some extent. Hence brighter colors may be used in a large building, than in one of more moderate dimensions. For these reasons it is absolutely necessary that both colors and designs should be studied *in situ*, and it must be borne in mind that in hot, sunny climates, stronger colors can be used than under our grey skies. One of the most important principles to be observed in designing the decoration of a building, is that harmony of color or unity of tone should pervade the whole. It is a common failing, even with men of great practical experience, to decorate different portions of a building in a manner totally at variance with other portions, and with colors positively antagonistic to those used in immediately adjoining parts. Where this want of continuity occurs, a perfectly satisfactory result is impossible. The general effect is inevitably spoilt, the fault is radical, and the whole thing marred. We may admire as a separate thing the roof, wall or window so treated, but it is worse than lost to us as a part of the whole. We should seek rather to treat our building in such a way that at the first glance the individuality of the several parts should not be perceived—all being merged in one glorious general effect. One general tone of color should pervade the whole—stronger and broader in the lower portions, lighter and brighter and more aerial in the upper, richer and more attractive in the more important parts of the building.

This unity of tone, combined with the simplicity of the treatment and the beauty of the material of the decoration, is the secret of the success at St. Mark's, Venice, and of others of the best examples we know—as the Cappella Reale, Palermo, the Cathedral of Monreale, the Alhambra, &c., while almost any of the decorative houses of Pompei will serve for an example of the contrary effect resulting from want of unity, though a thousand valuable and interesting lessons may be there learnt. Partial decoration is very unsatisfactory, and, if in strong colors, is utterly destructive of the general effect of the architecture—as, for instance, where the walls, arcades, &c., are left perfectly devoid of color, and the roof, ceiling, or vaulting is elaborately decorated, as is the case in the crypt of St. Miniato, Florence, the ceiling of the nave of Peterborough Cathedral, &c. In both these instances the architecture is left nude and unadorned, and in the latter our attention is at once attracted and concentrated on the ugly flat ceiling, by reason of the richness of the decoration; whereas, had the same amount of color been distributed over the walls and ceiling, increasing in richness in relative proportion to the importance of the several parts, the general beauty of the whole would have been much increased, and that ugly feature, the plain, almost flat ceiling, might have passed unobserved and uncriticised. My objections, however, do not apply to the coloring itself.

The deduction I draw from this is, that a certain amount of color, even if small, will produce a better and more satisfactory result when distributed over the whole building, than if concentrated on one feature gorgeously decorated, while all the rest is left naked, and more especially if the chosen feature is one of the ugliest conceivable. Gradation is another principle of immense importance in decoration. For the color of a building should not be applied of one equal depth from top to bottom. The broad and deep masses of color in the lower parts should pass by regular gradations to lighter and purer colors in the upper parts—the darker colors being carried into the lighter ones in gradually decreasing quantities, and *vice versa*. The decoration should also increase in richness of pattern, as well as in brightness of color, in the upper parts of the building. In the case of a church this principle of gradation is of twofold importance; for the decorations should be so arranged, that the eye, and the mind through it, is led on by the increasing richness, step by step, to that part of the edifice in which the most solemn of the services are performed, culminating in richness about the objects more immediately connected with those services—as the chancel, where the priests and choir are stationed; the altar table, at which the faithful communicate; the pulpit, whence the word of God is expounded to them; and the font, in which they are baptized.

Another point there is which I must mention before leaving this portion of my subject, though it can hardly be called a principle or rule: it is the absolute necessity for the whole of the decorations of a building being regulated by the taste of the architect, both as to style of treatment, arrangement, number and character of subjects, &c., so that by the perfect harmony it may be apparent that one mind and one will has directed and guided the whole.

Having noticed some of the most important principles to be observed in designing church decorations, I will now proceed to the consideration of the materials at our disposal, the methods of applying them, and the positions to which each, from its nature and properties, seems best adapted. The simplest way perhaps to do this will be to take the several parts of the building separately, working upwards, and consequently beginning with the floor and walls.

First and foremost amongst the materials for floor pavement stands marble and stone mosaic; secondly, I place marble or stone flags, adorned with incised patterns, inlaid with cement of another color; thirdly, encaustic tiles; fourthly, scagliola and cements. Marble mosaic is at once the most beautiful, the most appropriate, and the most costly of paving materials. In the time of the Romans three varieties of mosaic were used. 1st, the opus Sectile, composed of pieces of marble, generally black or white, cut to the various shapes and sizes required to form geometrical or other patterns; 2nd, the opus Tesselatum, composed of pieces of marble of a great variety of colors, about half an inch square on the face, and varying in depth from half an inch to an inch and a half. These were stuck lengthwise into a bed of cement, and arranged to form the most elaborate designs; 3rd, Mosaic proper, or opus Musivum, composed of small glass tesseræ.

From the time of Constantine to the 13th century, marble mosaic of the kind known as opus Alexandrinum was commonly used for the pavement of churches. It was composed of small pieces of porphyry, serpentine, and other hard stones, arranged in geometrical patterns, set in in grooves or sinkings cut in the white marble ground. The pavement of the chapel of St. James, Church of St. Miniato, Florence, is a fine specimen of this style of work. The chapel is of the 15th century, but this pavement is either older or a copy of an older work. Owing to the quietness and harmony of the color, and the beauty of the material, the effect is far less objectionable than might have been expected from the use of so large a design in so small a building; for a pavement covering the whole floor with one large pattern is bad in principle, as tending to diminish the apparent size of the whole building. This pavement is in fact a beautiful thing misplaced. Had the floor been covered simply with alternate squares or other simple forms of white marble and the porphyry mosaic, the general effect would have been far better. The materials of which this pavement is composed are red and green porphyry, giallo antico, and the white ground. In the basilicas of Rome and elsewhere, there are numerous ancient and most beautiful examples remaining.

In the succeeding ages the designs of mosaic pavement became of a mixed character, a combination as it were of the opus Alexandrinum with the opus sectile, and the flatness of treatment, a most important element, was gradually lost, and patterns representing raised or uneven surfaces introduced. At S. Mark's, Venice, there is much bad design of this kind mixed up with a great deal that is quite excellent. The illustrations on the wall show specimens of both the good and the bad.

With the Renaissance, ornamental patterns, composed of conventional representations of birds, flowers, fruit, &c., were introduced, and gradually developed into regular pictorial representations, such as we find at Sienna Cathedral,—a style which I think is quite unfitted for the purpose. The best specimens from S. Mark's may be quite safely taken as a "point de départ" in designing marble pavements.

In all the most successful and beautiful Mediæval marble pavements that remain to us, the treatment is remarkable for simplicity and artistic feeling; large surfaces are broadly covered with small diaper patterns in a few colors of low quiet tone. The patterns are frequently varied or the colors interchanged. The patterns not being separated by elaborate borders, but either boldly carried up to one another, or separated by a simple band of marble or stone, as in S. Mark's—exactly in the same way, in fact, as the diapers are treated in the Japanese drawings hung on the wall, and kindly lent to me for the occasion by Mr. Brough and Mr. Bennett. I exhibit them, I may here state, as showing in a remarkable degree just the qualities and treatment required in decorative painting. I would call attention to the thoroughly artistic manner in which they are conceived and executed, the extraordinary amount of thought exhibited in every part of them, even in the most commonplace details, the emphatic manner in which remarkable or important facts are insisted on, to the designed diapers which enrich every inch of the draperies, &c., with an endless variety of beautiful patterns and colors, and the quality and variety of the textures which are in some instances got by stamping or embossing a pattern on the paper before coloring. I have seen a drawing of a perfectly white bird, in which the feathers were shown in this way. The drawing of the figures is also very remarkable, there is such an economy of lines in the features as is only equalled in the woodcuts of Albert Durer; the lines of the draperies fall gracefully, the figures walk easily, stand firmly, and some of them even seem to fall painfully.

Turn to the landscapes; see how truthfully and yet how simply the character and color of the trees is rendered. Note how the artist has seized and imparted to his drawing the spirit of the scene; whether the starry night, the crimson sunset, or the snowy winter, the effect of each is perfect, and obtained with a marvellously small amount of work; but then the work is just of the right sort, and put just in the right place. Examine also the variety and beauty of the tints and the brilliancy of the black, and yet only four colors are used, including the latter.

I believe that works of this character are the very best that an artist in architectural decoration can study. Let him work at them till he can express with the same ease, simplicity, truthfulness, and artistic feeling the incidents of our everyday life—drawing from nature, at the same time of course—and he will then be better prepared to execute architectural decoration than if he had studied in any other school that I know of. As I shall have to speak of decorative painting hereafter, I will now return to the subject of mosaic floors, in designing which every combination of color, or arrangement of form, which, when seen either point blank or in perspective, produces the effect of a relieved pattern or inequality of surface is bad, and must be strictly avoided. The beauty of a flat pavement is its evenness, and it can neither appear, nor be, too even. The colors used in these pavements must either harmonize with those on the walls, or a neutral grey tone must pervade the whole. Mr. Digby Wyatt's book on mosaic work is full of the most valuable information on the subject.

Next to the marble mosaic pavements in costliness of material and beauty of workmanship stands the inlaid marble or stone, as an example of which I have here a drawing of a pavement, which in 1857 formed a pathway up the nave of the church of S. Miniato, from the west doors to the choir arch. The interior of the church was at that time being converted into a cemetery, and I have since heard that this beautiful pavement has been removed, having been purchased, it was said, by an Englishman. It was a beautiful specimen of a style of which but few original examples are now to be found. It was formed of a series of squares placed one after the other, without anything to divide them, the width being equal to one square, or about eleven feet. One of the squares, I remember, contained a very beautiful zodiac, of which I am sorry to say I did not make a drawing. The peculiarity of the work consists in the removal of the white marble ground, and the filling up of the cavities thus formed with black or red cement, so as to leave a white pattern on a dark colored ground.

Another style of incised pavements is illustrated by this series of beautiful tracings, made from the originals by my friend Mr. Nesfield, who has kindly lent them to me for exhibition this evening. It exists in the church of S. Remy, at Rheims, and is, I believe, the only known example of the style. It consists of a series of subjects from the Bible splendidly designed and very freely drawn on the flag stones with a strong firm line, which is then sunk deeply into the stone, and filled up with lead.

The next material for pavements we have to consider is tile, the use of which dates back to very early ages. Monsieur de Caumont says, that squares of terra cotta and stone were used for pavement as early as the fifth century, though the oldest encaustic tile pavement now existing is probably not of earlier date than the twelfth century; those lately discovered in the chapels of the Virgin and S. Cucuphas, at the abbey of S. Denis, being probably the oldest known examples. These pavements are composed of small pieces of encaustic tile, of various shapes, fitted together to form patterns, and are clearly imitations of marble mosaic; they are, in fact, mosaics composed of small pieces of encaustic tile. The construction of some of these tiles is very curious. In the pavement of the chapel of S. Cucuphas they take the form of a fleur-de-lis, composed of several parts. In another pattern each tile is pierced with a quatrefoiled or circular hole, into which corresponding pieces are made to fit; the colors in each case being yellow on a dark green ground. In some of the tiles of this period the green is marbled to resemble more nearly the old marble mosaic work from which it was copied. A beautiful pavement in the neighbourhood of Dresden, is described by Monsieur Viollet le Duc in his excellent Dictionary, the method of treatment and colors being black and red, with a narrow line of white encircling each centre piece.

In the thirteenth century dark red was the common ground color, instead of dark green as in the twelfth. The system of manufacture also became totally changed; the tiles being made square and ornamented with patterns stamped in and filled with earth of a yellow color, or *vice versa;* the pattern was formed with red earth in a yellow ground. Black tiles were often used for borders. In making these tiles a thin layer of fine earth of the ground color was applied to a backing of common red earth, into which the pattern was stamped quite through the ground, and afterwards was filled in with earth of another color; the pattern being thus so incorporated with tile that the one would last almost as long as the other. In French pavements of the twelfth century stone was often used in combination with tile, but the practice entirely ceased in the thirteenth century. The fact of red predominating as the ground color of tiles of the thirteenth century is probably owing to one of the processes of manufacture used in the twelfth century being then omitted, viz., the laying on of a ground color; at the later date the pattern being stamped into the material of the tile itself. The glazing was always yellow, and spread equally over the body of the tile and the pattern. The patterns on these tiles were either complete on each one, or was formed by placing four tiles together. Simple geometrical patterns were used at first—afterwards more elaborate ones—as monograms, inscriptions, symbols, arms, birds, beasts, fishes, and even figure subjects.

Later still, paving tiles were treated as common earthenware, enamelled on the surface with various colors, blue, yellow, and green being most commonly used—a style of ornamentation quite unadapted to the purposes in question, and on which therefore I need not dwell, although such are still used in Italy, Spain, Africa and the East. Tiles made of very hard earth, with patterns on them in relief, were also used in the middle ages.

Some tiles from Castle Rising, Norfolk, have the patterns raised on the surface, while in others they are sunk. One of them bears the name Thomas in raised characters, but the letters are reversed just as they would appear on the block for stamping a sunk pattern. They are very rude in manufacture, have been glazed, and appear to belong to the fourteenth century. The tiles found in the foundations of Chertsey Abbey, which may probably be attributed to the early part of the thirteenth century, are excellent examples for their thoroughly artistic treatment and beauty of manufacture. They are now in the Architectural Museum.

Thanks to the energy and perseverance of Messrs. Minton, Maw, Godwin, and other gentlemen, the manufacture of encaustic tiles has been revived and brought to great perfection in this country. It is very economical, and after marble and stone the most durable and appropriate material we can use for the pavement of churches. In employing it, however, certain effects must be guarded against, for instance, the color must be so broken up as to avoid the occurrence of great masses of plain heavy color against which other colored decorations would pale and lose all value. The remarks I have made regarding the design and colors of marble mosaic apply equally to these materials; in addition thereto, however, I must specially recommend you to avoid the use of antagonistic colors, such as blue, pink, &c., which though popular, are bad. The old tiles in few and simple colors seem to me far more satisfactory in appearance than the gay flaunting colors of so many modern ones. The old tile pavements still existing in Fountains Abbey are excellent examples of the style we should follow out in this material. With regard to the proper use of glazed tiles, I think it is better to confine them to such portions of the floor as are least exposed to wear and tear of constant traffic, as the chancel, sacrarium, &c., or as margins to the passages. For pavements where there is much traffic, it is better to use the unglazed mosaic tiles, arranged in a manner similar to the French examples I have mentioned above. Tiles with designs in relief are ill-adapted for pavements on account of the difficulty there is in thoroughly cleansing the surface.

The next materials I have to mention as suitable for church pavement are concrete and scagliola, both of which have been in use in Italy since the time of Pliny, who mentions them under the name of Opus Græcanicum. Vitruvius describes the first as consisting simply of two coats of concrete beaten down and well rolled, the upper one being very fine and polished with a hone or polishing stone. This upper coat was frequently mixed with powdered charcoal, lime, sand, and ashes, which gave it, when polished, the appearance of black marble. The second method was denominated Lithostrata, strewn with stones: it was made by strewing the upper coat of cement or concrete, while wet, with small pieces of broken marble of divers colors, either mixed together or arranged in patterns, which were beaten down and rolled in with a heavy roller; when thoroughly set, the whole surface was sanded and polished. Both of these methods are in use to this day in Italy, under the name of Pavimento Veneziano. They are very beautiful, economical, and cleanly, and of course can be made of the same colors as marble mosaic.

Floors have been made of our English cements and lava artificially colored, and tolerably good effects may be produced in this way; economy is, of course, their chief recommendation. I do not advocate the employment of them for this purpose; but if they are used, they must be used as cement and not in imitation of stone or other materials. In using them great care is required to prevent any settlement of the concrete, for cracks soon lead to complete destruction.

Let us now proceed to the consideration of the various methods of decoration which may be applied to the walls and vaulting of churches. Professor Willis, in the Paper which he recently read here, used the term *decorative architecture* to describe an arcade recently discovered in the chapter house of Worcester Cathedral, constructed of different colored stones enriched with carving. As this term expresses concisely and clearly such a system of constructional decoration, I shall borrow it to indicate that style of ornamentation which I place first, as being the best method we can employ in the structural parts of the building, and shall include under it ornamental brickwork, and all other decoration that is of a strictly structural character. Next in order I place Mosaic, either of marble, as the Florentine work; of glass, as the Byzantine, Roman, and Venetian; and of encaustic tiles. In the third place: Painting, including both subject or figure painting and simple architectural ornament, and noticing the several methods of execution, as fresco buonos, tempera, encaustic and oil. Fourth: incised or inlaid ornament on stone. And fifth and last: decoration in plaster, under which head I shall bring before your notice the process known in Italy as sgrafitowork, stamped or incised stucco, and colored plaster or cements.

The simplest form of constructional decoration is that so frequently employed in the churches of France and Italy, consisting of alternate horizontal courses of black and white, or red and white, stone or marble running throughout the walls and piers, with alternate voussoirs of the same colors in the arches; the cathedrals at Genoa and Sienna; the cathedral and church of S.S. Zeno and Anastasia, at Verona; the Abbey of Vezelay, in France, are all good examples. In England, the example at Worcester, noticed by Professor Willis, is the only one with which I am acquainted. In Ireland there are, I believe, several good examples. In some of these instances the bands are of unequal height, in others they are about equal. I do not know of any example in which the colors are alternated vertically, or even in a zig-zag form; though sometimes, as in the Ducal Palace at Venice, they form a diaper resembling the opus reticulatum of the Romans. Monolithic shafts appear to be the only form in which colored stones were used in vertical lines.

This system, as applied to wall surface, is extremely effective, simple and appropriate, but is injurious when applied to the columns, or arcade piers, as it tends to reduce the apparent strength and height by interrupting the continuity of the vertical lines, which is the essential characteristic of a column. This objection, however, does not apply to molded bands round shafts, because by virtue of their projection they increase the apparent strength. If lines are employed to decorate columns or piers, they should either be vertical, zig-zagged, or very slowly twisted, as at S. Savin, in Poitou, Waltham Abbey, and many other good examples.

Above the arcading, in the example at Worcester, is a molded cornice constructed of alternate blocks of black and white stone, the moldings and a carved enrichment being carried continuously along it. Now, this I regard as quite a wrong application of the system, as the alternation of the strong colors quite destroys the lines of the cornice, the shadows being almost lost on the dark colored stone, and the beauty of the carving consequently diminished. It is as though one painted a coarse chequer over a delicate enrichment. In this sunless climate, where there is so little light to produce shadow, all sculptures, whether indoors or out, should be executed in a light colored material, but more especially is this necessary in the interior of churches, where a glare of light is impossible, as being at variance with the solemn effect we seek to obtain.

The next step in this style of decoration is the combination of carved surface ornament with colored material; this is effected in a simple and very charming manner by carving the courses of light colored stone, when narrow, with geometrical or floriated ornament, and when broad, with sculptured subjects; both in low relief, or a combination of the two. The effect being extremely rich and beautiful. Sculpture, I think, should never be colored, though gold, or color of low quiet tone, may be used on the back ground with good effect, especially when the other parts of the fabric are decorated with color.

With regard to the subjects which should be sculptured on these bands, I cannot do better than quote a passage or two from the writings of Mr. Ruskin, for they exactly express my feelings on the subject, clothed in far more beautiful language than I can command. Speaking of subjects for architectural ornament, he says: " Consider what a field is opened to your fancy merely in the subject matter which architecture admits. . . . . Is there anything within range of sight or conception, which may not be of use to you, or in which your interest may not be excited with advantage to you all? From visions of angels down to the least important gesture of a child at play, whatever may be conceived of Divine or beheld of human, may be dared or adopted by you. Throughout the kingdom of animal life no creature is so vast, or so minute, that you cannot deal with it, or bring it into service. The lion and the crocodile will couch about your shafts; the moth and the bee will sun themselves upon your flowers; for you the fawn will leap; for you the snail be slow; for you the dove smooth her bosom; and the hawk spread her wings towards the south. All the wide world of vegetation blooms and bends for you; the leaves tremble that you may bid them be still under the marble snow; the thorn and the thistle which the earth casts forth as evil are to you the kindliest servants; no dying petal, nor drooping tendril is so feeble as to have no help for you; no robed pride of blossom so kingly, but it will lay aside its purple to receive at your hands the pale immortality. Is there anything in common life too mean, in common things too trivial, to be ennobled by your touch? As there is nothing in life, so there is nothing in lifelessness which has not its lesson for you, or its gift; and when you are tired of watching the strength of the plume and the tenderness of the leaf, you may walk down to your rough river shore, or into the thickest markets of your thoroughfares, and there is not a piece of torn cable that will not twine itself into a perfect moulding; there is not a fragment of cast away matting, or shattered basket work that will not work into a chequer or a capital. Yes, and if you gather up the very sand, and break the stone on which you tread, among its fragments of all but invisible shells, you will find forms that will take their place, and that proudly among the starred traceries of your vaulting; and you who can crown the mountain with its fortress, and the city with its towers, are thus able also to give beauty to ashes and worthiness to dust." Elsewhere, Mr. Ruskin says: "All high Art consists in the carving or painting natural objects, chiefly figures; it has always subject and meaning, never consisting solely in arrangement of lines, or even colours. It always paints or carves something that it sees or believes in; nothing ideal or uncredited; for the most part it paints and carves the men and things that are visible around it. And as soon as we possess a body of sculptors able, and willing, and having leave from the English public, to carve on the facades of our cathedrals portraits of the living bishops, deans, canons, and choristers, who are to minister in the said cathedrals . . . . and on our buildings generally, the birds and flowers which are singing and budding in the fields around them, we shall have a school of English architecture, and not till then."

Another system of decoration for plain surfaces, which may be used very successfully, either by itself or in combination with the above, and which is itself to a certain extent constructional, is Ashlar facing of various colored stones or marble arranged in diapers or other patterns.

The Romans used several sorts of ornamental masonry, as the opus spicatum, opus recticulatum, &c. which were almost invariably formed of two sorts of stone, and arranged in bands alternately with plain masonry. In the eleventh and twelfth centuries these forms were imitated on the exteriors of many of the churches in the south of France, with very charming effect, and offer valuable suggestions for the decoration of the interiors as well as the exteriors of our churches. Stones of other forms were also used, as the hexagonal, the lozenge, and forms rounded on one side and square on the other, all set in colored mortar. When this system of constructional decoration is used for the wall surface, the several architectural features, as doors, windows, &c., should be made to harmonize with it by the employment of similarly colored stones in the voussoirs of arches, shafts, shaft bands, &c.; but it must be borne in mind that shafts ought to be brought into due prominence by being made of a lighter and brighter material than the surrounding parts, as, for instance, granite or Purbeck marble polished, which two materials appear to harmonize better with plain masonry than any other colored stones I know of. I do not remember an instance where the shafts are of black marble, serpentine, or other dark colored stone that is thoroughly pleasing or graceful. The marbles and limestones of Ireland are of great beauty and variety, and admirably adapted for this constructive decoration. I have here a few specimens of the building stone generally used in Cork, which I picked up in the quarries in the neighbourhood of the town, all of which are well suited for that style of ornamentation, to which I have applied the name Decorative Architecture.

In many churches in Lombardy and other parts of Italy the interior is finished entirely with brick, and with excellent effect. In the churches of France molded and stamped bricks, or terra cotta, were used for decorative purposes as early as the Carlovingian era. I need only point to the beautiful churches recently erected by Mr. Street, Mr. Butterfield, and others, to show how much may be done with our own common brick. The color of terra cotta is well suited for constructional decoration, and beautiful enrichments may be produced in it. The treatment, however, must be such as will prevent any misunderstanding of the character of the material; and here I must again remind you of the axiom, that for ornament to be properly appreciated, there must be plenty of plain unenriched surface to contrast with and give value to it.

The next step to decorative masonry is the incrustation of the walls with marble mosaic, as employed in the buildings of Pisa, Florence, Perugia, &c. Mosaic of this kind is particularly well adapted to the decoration of churches, on account of the beautifully quiet colors of the material, which are of that quality and tone that best harmonize with masonry. I do not advocate its use all over the surface of the walls, as in the Campanile and Duomo at Florence, which, viewed in a mass, always seems to me too pretty and suggestive of cabinet maker's work, and not well suited to our more masculine northern Gothic; but applied more sparingly in occasional belts or zones of patterns, or to adorn the constructional features, it is one of the noblest and most beautiful methods of surface decorations we can use, and being of a costly material and difficult of execution, is well worthy of a place in buildings where all should be of the best we can offer. The patterns in which it is employed should be of simple construction and not too small—the colors few and well contrasted. If we want very elaborate patterns or rich colors, it is better to employ glass mosaic, and alter the treatment altogether. The patterns may be either purely geometrical or simple conventional representations of natural objects. To the irregularity of the color and marking of natural stones and marbles, is in a great measure due their superiority of appearance over manufactured substances, as tiles, &c. This unevenness or breaking up of the colors is one of the great secrets of success in decoration. In nature's works we find it almost invariably in some form or other. If you look at Japanese pictures you will find that in many parts the artist has gone out of his way to get rid of regularity and evenness of color, and with the most happy results. Marbles and stones are more beautiful when brought down to a polished surface than when rough. Glass mosaic, on the contrary, produces the best effect when left rough as fractured. In churches where large congregations frequently assemble, the lower part of the walls soon become soiled, for which reason it is desirable to employ in such positions a material that can be easily cleansed without injury to it. For this purpose nothing is so suitable as marble or alabaster; the slabs sawn from the same block being placed together so that the veining forms a sort of pattern. Those of you who know S. Mark's at Venice, and the cathedral of Monreale will remember how beautiful the effect of this treatment is. Some idea of it may be formed from illustrations on the wall. The beautiful band of mosaic which runs along the top at Monreale gives a charming finish to it, while at the same time it brings down the color from the mosaic pictures above.

When the means at our disposal will not admit of the use of marble, the harder building stones and encaustic tiles may be used together with very good effect, though I think that tiles are ill suited for wall decoration.

When an architect has good stone for his building material he very naturally and properly trusts to the mason's handicraft for his principal ornamentation, making his surface ornament subservient to the moldings and carving with which he adorns the construction. For colored decoration in such a structure marble mosaic and fresco are the proper materials to use; but stone with us is scarce, and brick is the material of which we most commonly have to construct our buildings, in which case glass mosaic is one of the best methods of decoration we can employ, being durable, easily cleansed, and well adapted for use on brickwork. Hitherto, however, English manufacturers have not succeeded in producing a glass mosaic at all equal to old work or even to the modern Russian or Venetian, such as that of Signor Salviati. But the Messrs. Powell, Messrs. Maw, and others are now taking the matter up with energy, and I have no doubt that before long their efforts will be rewarded with success. The proposed decoration of St. Paul's Cathedral is probably giving the impetus to this movement.

In the International Exhibition of last year there were two Russian glass mosaics, placed in juxtaposition. In one the surface was smooth and polished; in the other it was left rough, as the tesseræ were broken. The effect of the rough work was far superior to the smooth. After a careful examination of old mosaics, and the best modern ones in Italy, I am convinced that the charming effect of this sort of decoration is in a great measure owing to the roughness of the surface and the largeness of the mortar joints. The gold mosaic of the ground, on which the effect depends more, perhaps, than on anything else, has offered more difficulties than any of the colored varieties; but these are now, I think, nearly overcome.

The cost of the production is, of course, of primary importance, but on this point Messrs. Powell are not at present able to speak definitely. Before leaving this subject I must say a few words as to the colors and style of decoration. The chief inducement to use glass mosaic appears to me to be the glorious effect of the gold ground and the brightness of the colors. The effect of blue or white for the general ground-color is not sufficiently satisfactory to repay us for the expense of covering large surfaces with so costly a material; but no other material, and no other method even of applying gold, equals the beauty and richness of gold mosaic. The larger the surface covered, the better it looks—the effect amply repaying the cost of production. Glass mosaic is, I think, quite unsuited for the execution of figures or subjects; it is, however, admirably adapted for architectural ornament, as geometrical figures, diapers, zig-zags, interlacing or running ornament, and conventional representations of natural foliage, flowers, &c., as in the Byzantine and the early Pointed styles; the bulk of the colors employed in these ornaments should always be light and delicate tints, relieved by black and white, and the darker colors in very small portions; the last named, the darker colors, being separated from the gold ground by a black line, the lighter ones by a red line. The colors used should be few and well assorted. The superficial area of the ground should very much exceed that of the ornamented parts. The patterns in the ornament should be bold and clear, sufficient irregularity being obtained by the variation in the tesseræ, which here play much the same part as the stitches in a Turkey carpet, blending and breaking up the colors of the bold patterns in a most charming manner. The tesseræ should not be more than half an inch square; if larger the work loses much of its effect, while if they are less than three-eighths of an inch the work is less effective at a distance, and at the same time is more costly.

The branch of my subject which now invites our attention is Painting, properly so called, for the glass mosaic which we have just been considering is often improperly termed mosaic painting. In the term painting I include four distinct methods, viz. fresco buono, or true fresco; fresco secco, or tempera; encaustic, and oil; the new water-glass process not being a new method of painting, but merely a new preservative process, applicable alike to fresco or tempera. From the time when fresco painting was first used, which, as far as we know, was by the Egyptians, two thousand years at least before the Christian era, to the present time, the art has seen many vicissitudes. Neglected by the Greeks for the more favoured encaustic, it was revived by the Romans, to be again set aside in the time of Constantine to make way for its new rival, glass mosaic; revived by Cimabue, it flourished for four centuries; again fell into disuse in the dark ages, and has been again revived in this nineteenth century. But through all these fluctuations of favour, the art has never been utterly lost, but, having been always more or less practised, a thorough knowledge of the technical processes has been preserved and handed down from age to age, and consequently the revival of the art has been a comparatively easy matter. It is without doubt, next to sculpture, the noblest and most splendid means of decorating our churches. From the earliest time of the Church it has been used for this purpose, its lightness and clearness of tone, its cheapness, durability, and grandeur, making it, as it ever will be, a favourite vehicle.

In the catacombs of Rome, as early as the fourth century, it was employed to decorate chambers devoted to religious purposes; though the earliest representation of the Crucifixion of which we have any record is that mentioned by Gregory of Tours, in the middle of the sixth century, as having been recently erected in the cathedral of Narbonne.

I do not propose to occupy your time this evening with an account of the various technical processes of the four methods of painting I have enumerated above, as our contributing visitor, Mr. Purdie, has undertaken to read a paper on them at the next meeting. But I will briefly draw your attention to one or two points to which it is the architect's special province to attend; the most important of which is, the construction of the wall on which the subjects are to be painted. The objects to be secured are a perfectly even vertical surface affording a good key for the plaster, and complete imperviousness to moisture or damp from without. Good brick is the best material for this purpose, especially if built double with a small hollow between the outer and inner skin, the two being nevertheless properly bonded together, and the whole protected from the damp at top and bottom by a layer of asphalte. Rubble masonry is bad on account of its uneven surface, and all stone work is very subject to the absorption of damp. To prevent evil effects from this, a good plan is to coat the interior of the wall with a composition of pitch and coarse sand, on which the first coat of plaster is laid, and when set cannot be separated from it. In Italy it is a common practice to stick tiles against the face of the wall, or to form a trellis of laths, on which the plaster is spread; but in both of these systems one of the most important principles of fresco painting is lost. I mean that the pictures should be painted on, and, as it were, form part of the actal construction. When frescos are painted on a dome or vault, the upper surface of the stone or brickwork should be rendered with cement, asphalte, or pitch and sand. Some of the frescos in Pompeii are executed on walls of thin bricks or tiles placed edgewise, detached, but bonded to the walls with leaden cramps. If there is any doubt about there being a sufficient key for the plaster, small pieces of flint stones or bronze nails slightly projecting may be built into the joints of the brickwork, and will effectually prevent the fresco becoming detached. Bad masonry, bad stucco, and last and most important, dampness, are the principal causes of the ruin and destruction of frescos. Too much care cannot be taken to prevent these, as frescos should last as long as the building they adorn.

The colors used are the same in fresco buono and fresco secco or tempera; they are mixed in the same way, with water, lime being the white pigment; to which is added for some colors in fresco buono, and to all in tempera, a size or gluten, which becomes insoluble when combined with the lime. For this reason fresco secco, when well done, will bear washing just as well as fresco buono. Fresco buono is executed or incorporated with the wet plaster, of which sufficient only for the day's work must be laid on at a time.

One drawback to the general employment of fresco painting is the great length of time that is required for preparing the walls, materials, and cartoons, and in the actual execution of the work. For the walls and under coat of plaster must be perfectly free from damp before the painting can be commenced: the lime must be made, slaked, and buried for months or even years before it can be safely used. The first coat of plaster ought to be laid on some years before it is finally prepared for the painting, unless very old lime is used, but even then six or twelve months must be allowed to elapse before it is painted on. Then the difficulties in the processes of painting in real fresco are so great that it is only to men of great practical knowledge and ability that mural paintings of this kind can be safely intrusted; for the surface of the plaster being damp, the colors have a fictitious appearance while the artist is at work. The choice of colors is limited to those which are not affected by the lime; the artist must each day commence and finish a portion of his work before he can even sketch the adjoining parts; he cannot therefore consider his picture as a whole composition, nor can he retouch it after it is finished, except with another vehicle, such retouching being almost sure to become opaque, easily distinguishable from, and very detrimental to, the original work. For subject painting, however, as a means of decorating architecture, I regard it as the first and best process. For lightness, purity, luminosity of color, and power of giving expression, it is unequalled by any other medium; while the vehicle is the least destructible of any, and if properly used and untouched with distemper or other colors, may be cleaned with water without fear of injury.

Fresco secco is admirably adapted for the execution of ordinary architectural decorations, for which purpose it is most commonly used in Italy. The colors and vehicle used are, as I have said before, the same as those employed in fresco buono; but, owing to the different method of applying them, they always look opaque and heavy, which renders the process unfit for subject painting, though for mere ornament it is of no importance. On the other hand, the process has many good points to recommend it: for instance, it is not very difficult of use; it is used on dry stucco; the work can be left and recommenced at any time and at any point; it is the most economical method of painting, and when well executed, may, Mr. Sarsfield Taylor says, be cleansed with water like real fresco.

Encaustic painting, the invention, or, at any rate, the application of which to mural decoration must be attributed to the Greeks, has, I believe, hardly been tried in this country, which is the more to be regretted, as, though more costly than fresco, it is a process which has many advantages to recommend its adoption. The churches of La Madeleine, Notre Dame de Lorette, and St. Vincent de Paul at Paris, are adorned with paintings done by this method.

From a careful examination of the Pompeian decorations, I am of opinion that many of the colors were applied or varnished with wax, in some of the reds and yellows it can still be distinctly traced. The specimens I lay before you will, I think, confirm this. The blue, however, appears to be mineral, and quite free from waxy matter. The extraordinary preservation of the colours is a strong argument in favour of this supposition. The process was extensively used till the 9th and 10th centuries, when it fell into disuse, but revived, and was again employed in the four following centuries.

Encaustic painting differs from fresco both in the process and in the vehicle used. It is probably more lasting than fresco, affords richer tones of color and more powerful effects of chiaro oscuro, and, moreover, the artist who uses it is not limited in his choice of colors. He can also sketch out his whole picture, and work it up gradually, and when he pleases; and as the method is very similar to oil painting, the artist accustomed to work in one will find little difficulty in using the other. It may be used in conjunction with fresco: as, for instance, for painting ornaments or even figures on a flat ground of real fresco, producing a very beautiful and rich effect at a much less cost than if the whole work had been executed with it. It is of the greatest importance that the walls and plaster should be perfectly dry before the painting is commenced.

There was also a sort of bastard encaustic used by the Romans, the picture being painted in distemper and afterwards varnished with wax, but in other respects treated as true encaustic. I cannot find any record of ancient paintings in oil on plaster. This is probably owing to several causes: firstly, to the vehicle having been so little known until the time of the Van Eycks in the 15th century; and secondly, the difficulty of applying it to plaster, and its liability to become dark and discolored with age. But now that the manufacture of oils and varnishes has so much improved, and we have a material like Parian cement, which, when applied to a wall that is no longer damp, may be painted safely as soon as it is laid on, I think it is quite worth our consideration whether this vehicle could not be thus advantageously employed.

Having considered the various processes which may be employed in mural painting, I will now say a few words on the style of ornament and the subjects that are best suited for the decoration of church walls and roofs, and of the arrangement of them thereon. When subject pictures are used, they should be placed at a height of not less than 6 feet from the floor, in order that they may be well seen, even when a crowd is between the spectator and the picture. When the pictures are at a great height, and can only be seen from a spot near to them, it will be advisable to make a little allowance for this in the drawing, as we find so constantly done, even to the extent of distortion, in Gothic sculpture placed at a considerable height above the eye—the vertical dimensions being increased and the horizontal projections reduced; as in sitting figures, for instance, in which the thighs are often made only half the length of the lower leg. With the last generation of painters it was not unusual to paint the figures of gigantic size, and to speak of them as of *heroic* size, which meant, I suppose, that they were what

Shakespeare calls "tall fellows of their hands;" but this is a species of hero worship we no longer appreciate, and it must indeed be a rare case where all the persons represented are or were tall fellows. As a rule, I would restrict all the figures in mural painting to life size, or, when at a great height, to such dimensions as will make them appear to the spectator about the size of life. An exception, however, may be made to this rule in certain cases—as, for instance, in a series of pictures representing incidents in the life of a Saint, the history of the Creation, or the great events of our Lord's life, where the principal figure may legitimately be made larger than the others, in order to emphasize and give importance to it. There is no lack of subjects suited to the adornment of our church walls. I say walls, for I would never paint subjects or figures on ceilings, roofs, or domes. The difficulty is to select those which are most appropriate. The subjects used to decorate a building should be illustrative of its use or of the history of the nation that erected it. In the case of a church they should illustrate the history and practice of the religion of the people, the articles of their faith, &c. The Old and New Testaments alone offer an almost endless list of subjects for this purpose. Then there are the histories of those who have lived and died for their religion—Patriarchs, Prophets, Apostles, Saints, and Martyrs; the River of Paradise, the Church and the Synagogue, the Tree of Jesse, the Parables and Miracles of our Lord, and the mighty events of his Life, Death, and Resurrection; the Last Judgment, the reward of good men, the punishment of the bad; man reaping in the sweat of his brow the fruits of the seasons and all the other blessings which are poured out for his benefit; the Arts and Sciences, all of which proceed from God and tend to his glorification; the Virtues and Vices; the Signs of the Zodiac, as symbolical of Time and the Seasons; and I know not how many others. In the choice and arrangements of these subjects the greatest care must be taken that each is appropriate to the position in which it is placed.

Downright good subject painting is the very finest decoration we can employ; but if we cannot afford good subject painting, don't let us have bad, but let us content ourselves with good ornament. Of the distinction between good and bad ornament, and what the special condition of the former is, I shall tell you in Mr. Ruskin's words. He says, "All ornament is base which takes for its subject human work: it is utterly base—painful to every rightly toned mind . . . . for to carve our own work, and set it up for admiration, is a miserable self-complacency, a contentment in our own wretched doings, when we might have been looking at God's doings. All noble ornament is the exact reverse of this. It is the expression of man's delight in God's work." "The especial condition of true ornament is, that it be beautiful in its place . . . . that it aid the effect of every portion of the building over which it has influence; that it does not by its richness make other parts bald, or, by its delicacy, make other parts coarse."

There is scarcely an object in nature which does not offer us some suggestion either for the form or color of ornament—in fact, in the best period of Gothic decoration, they reproduced in color every subject that the chisel of the sculptor carved in stone. In designing ornament it is necessary to conventionalize or modify natural forms to some extent, as, in order to maintain that severity of form which is the essential characteristic of architecture, a certain angularity must prevail in the decoration, though in colored decoration the form of the ornament is of much less importance than the color. Colored ornament may be applied in a variety of ways: in belts or zones—in diapers or in patches. When diapers are used, the pattern should be continued on without regard to doors, windows, or other like interruptions. The colors should not be strictly even and regular, but broken up, in order to avoid monotony and heaviness. In Italian houses this effect is often sought and obtained by distempering the walls in two colors, generally grey and yellow, in alternate vertical stripes, blended one into the other, over which a pattern is stencilled in two colors, also alternating—light on dark, and dark on light. On the subject of diapers the knowledge of the Japanese is very great, as the drawings on the walls to-night will prove to you. For information on the subject of the forms or patterns of architectural ornament, I cannot do better than refer you to an excellent paper by Mr. Burges, which you will find in the volume of the "Builder" for 1859, merely adding that as the forms of sacred edifices had their origin in significant symbolism, so may the ornaments employed to decorate them, and that the sacred monograms and various symbols and emblems offer a wide field from which to cull ornamental forms.

The colors used in the decoration of churches must be few in number, sober in tone, and not too dark. Strong color, such as we find in the middle church at Anissi, and in much of the Pompeian decoration, is only suited to buildings in which the windows are small, and there is consequently very little light, as is the case in hot climates, where the object is to keep out the sun. Here, where it so rarely shows itself, we are obliged to make our windows larger to get sufficient light, and must likewise use lighter colors in our decorations.

In the church of St. Anastasia at Verona there are some very interesting examples of wall and vault decoration, of which I have here two specimens. The colors employed are red, green, and yellow, all low in tone, on a cream-colored ground, with a little blue introduced in parts, and not very successfully. The patterns are all drawn with a strong outline in dark color. The general effect is very satisfactory—much more so, I think, than the more elaborate work in the crypt of S. Miniato, in which the colors are much too bright. In almost all good Gothic work the colors were few and these of low tones, whether in mural paintings, in the decoration of roofs and rood screens, as in the Norfolk churches, or in woven fabrics. In subjects which have to be viewed from a distance the figures should be marked out with a well defined line, red for the light colors—black for the dark ones. Gold forms a beautiful background for figures, but it should be broken up with a diaper, either painted on it or stamped into it; or it may be applied as a gold diaper on a painted ground. Plain flat gold does not look well. The figures should be generally lighter in tone than the gold ground, as was almost invariably the case in early works, whether in fresco or mosaic. The size and arrangement of the paintings must always be ruled by the architectural forms; but it must be remembered that there is a vast difference between covering the walls of a building with color and adorning them. In powdered patterns the beauty and intricacy is very much enhanced by using ornaments of two sorts, or in the case of stars of two sizes and different forms.

There are three other methods of decorating church walls and vaulting to which I must briefly draw your attention, in order to complete this branch of my subject. They are—1st. Patterns incised in the masonry, and filled up with colored cements, in a similar manner to the pavements of which I have already spoken, which is a very effective method of decoration, but must not be applied too liberally. It has been practised from very early times, for amongst the ruins of the church of S. Samson sur Rille, supposed to be anterior to the invasion of the Normans, fragments of stone have been found ornamented in this way. The 2nd is a very effective and inexpensive method of ornamentation in stucco of two colors, a good deal practised in Italy at the present time, where it is known by the name sgrafito. The method of operation is to place a coat of stucco of one color over a ground of another, and before the upper one is dry, to cut patterns in it, so that the ground is seen through. The specimen before you has been kindly lent me by Mr. Blomfield. The 3rd process is that invented by Mr. Ferrey, and known as stamped or incised stucco, of which there are also some specimens before you. The process consists in indenting ornamental patterns on the surface of the plastering as it proceeds. No effect is sought to be produced but what the plaster will naturally yield. In its application to wall surfaces, where color is desired, the devices may be so impressed as to insure the durability of fresco. The cost of this mode of ornamentation is so moderate that it will admit of very general use.

It remains to me to say a few words on wooden roofs. More than once it has been attempted to lay down a rule that decoration need not have any reference to the material, and that the timbers of a roof may be covered with a coat of plaster, and painted in the same style as the brick or stone walls of the building, the roof of Messina Cathedral being referred to as a convincing argument of the truth of this. With this opinion I must beg leave to differ altogether. If there is no architectural design in a roof, or the construction is concealed with a flat ceiling or deck of wood, as at Waltham, Peterborough, &c., by all means cover it with painted ornament, and make the best you can of such an ugly feature. Plain flat ceilings are a very unsatisfactory covering to churches; but if we must have a flat ceiling, let it be of wood, and let the tie beams at least show below, and let the spaces be in panels, and let the panels be painted with ornaments, and the beams picked out with color or gold; but it is far better to show the construction. If a painter were called on to design and decorate the roof of a church, I could understand his putting a flat ceiling and painting it; but we are architects, and have to think of more than the mere decoration. Our business in such a case is to put on a roof, in form beautiful, in construction sound, and scientifically adapted to the material used, which in this case is wood, and then to decorate, not to conceal, the material. Half the beauty of the thing consists in the evident victory of mind over matter, and this is almost lost if you hide the nature of the matter. I believe myself that the treatment of the roof of St. Miniato is very nearly right, though not carried far enough. It is far more honest than the Messina roof, of which I show a portion of the coloring of one of the tie beams. Another contrast is afforded by this specimen from the roof of the choir aisle of Monreale Cathedral. It is beautiful and most successful as a specimen of decoration; but for aught we can tell to the contrary, might be constructed of brick, or stone, or plaster.

Where a church is not covered with brick or stone vaulting, the best, and most honest and satisfactory treatment is to put a good open timber roof, to varnish the timbers, in order to preserve them, as well as to brighten the color, and then to adorn it with gilding or colored ornaments, or both, applied so as to emphasize the construction. The spaces between the rafters should be plastered, colored in distemper, and adorned with rich ornaments, the color being sufficiently strong to make the rafters appear light against it, and harmonizing with the wall decorations, so as to form, as it were, a link uniting the two. Where the roof is boarded on curved rafters, the best decoration is a powdering of gilt stars on rich patterns in color on the varnished wood for a ground.

In conclusion, I will say a few words on the combined use of colored glass and colored decorations. It appears to me that in this matter you cannot make a rule; for each case must be judged on its own merits. In some cases, where the walls are covered with subject painting, it will be absolutely necessary to fill the windows with colored glass, or to stop them up—as, for instance, when pictures are painted above or below, or close to a window, a situation in which the picture could never be seen if the glass were left light. But even in such a case the window from which the fresco is lighted must not have strong colored glass in it. When subject pictures are thus used in immediate contiguity to painted windows, there should be nothing but ornamental forms in the windows; and when subjects are used in the windows, the decoration of the walls must be restricted to ornamental forms. As we must take for our standard of stained glass the works of very early artists, who appear to have aimed at obtaining a rich mosaic effect with the most brilliant colors, we must always avoid using together glass mosaic for our wall decoration, and stained glass for our windows, as the greater brilliancy of the glass will quite neutralize the kindred beauty of the mosaic. Viollet le Duc says that after stained glass came into use, it was found that fresco painting produced so little effect, that the architects of the 13th century sought to substitute stained glass for all wall decoration, by reducing the wall surface to mere buttressed piers, to carry the vaulting, and filling in the whole intervening space with window tracery—a suggestion which may very probably be correct.

The CHAIRMAN, Mr. EWAN CHRISTIAN, V.P., said that Mr. Lightly had brought before them a large and interesting subject. The hour, however, was too late to admit of any discussion taking place that evening. Mr. Lightly had treated the subject so comprehensively, and had brought forward so great an amount of information upon the various topics touched upon, that he (the Chairman) was sure the members would unite in voting their unanimous thanks to him for his able and interesting paper.

A vote of thanks was accordingly passed by acclamation to Mr. Lightly for the paper he had read, and the meeting then adjourned.

314, Oxford Street,
London 9th June 1863
W.

Mr Purdie sends a note of an additional alteration which he wishes made on his paper - on P. 256 - & which he omitted on the corrected proof which he left yesterday —

Mr Drew
Please answer
him - & if possible
send proof as asked
if not say when

314, Oxford Street
London 22nd May 1863
W.

Dear Sir

Having to leave home for a short time about the first of June I am anxious to get the proof of my paper for the Architectural Institute corrected next week. - I should therefore esteem it a favour if you could arrange with the Printer to let me have it on Monday or Tuesday. —

I am Dear Sir
Yours Respectfully
Thos Purdie

THE STEREOCHROMIC AND OTHER TECHNICAL PROCESSES OF PAINTING CONSIDERED WITH REFERENCE TO THEIR EMPLOYMENT IN MURAL DECORATION.

By THOMAS PURDIE, Contributing Visitor.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, June 15, 1863.

SCARCELY forty-five years have elapsed since Ludwig the First, of Bavaria, summoned from Rome the band of young and then unknown German artists who were destined to restore to life the pictorial art of their native country, and to renew between Architecture and Painting that bond of union through which these kindred arts had achieved their greatest triumphs. Since the extinction of monumental painting in the decay of the later Italian schools of Bologna and Lombardy, no great school had arisen, and the very knowledge of the processes followed by the old masters, in the execution of their works, had almost perished. A few illustrious men had indeed appeared at intervals, whose names were only sufficient to connect by a slender link the times in which they lived with the Augustan age of art. But a period had arrived which was favourable to a revival of Architecture and Painting in Germany. During the French domination at the commencement of the present century, men were driven to seek, within the domain of abstract thought and in the fine arts, some compensation for that external political liberty which had been suppressed. A taste spread abroad for the literature, architecture, and painting of earlier times. The arts of the middle ages, long forgotten or despised, more and more attracted attention. The poems of the thirteenth and fourteenth centuries were translated, circulated, and eagerly read. Gothic architecture became a devout study, the pictures of the early masters were carefully (too carefully many may think) collected and lovingly cherished, and the processes which had been followed in the execution of these works were minutely investigated and analysed. Overbeck, Cornelius, Veit, and Schadow, under the influence of the spirit which then animated Germany, and in the belief that true art inspiration was only to be found at its Christian source, had already crossed the Alps and taken up their residence in the Eternal City. There they were soon joined by other men of kindred spirit, many of whom have gained for themselves enduring reputations. Banded together by a community of pursuits and feelings, they established themselves in a ruined convent, where, in poverty and seclusion, they set themselves to the fulfilment of their mission. For several years, during the winter months, these enthusiastic artists remained in their convent, pursuing their studies, each taking in turn the part of model to the others, as they could not afford to pay for professional aid. Emerging on the approach of spring to visit the sanctuaries which throughout Italy, were in earlier times dedicated at once to Art and to Religion, they everywhere found Architecture and Painting in close alliance. They thought they could discover that monumental painting had been maintained as long as men had high and holy thoughts to express by that form of art, and they felt that no greater triumph could be achieved than that of rivalling the artistic glories of the cinque cento, and embodying in imperishable fresco, ideas worthy of immortality. An opportunity of proving their knowledge and capacity soon occurred. The four artists we have named received a commission from the Prussian Consul General Bartholdy, to paint in fresco a series of scriptural subjects in his villa on the Trinita di Monte. A second series was executed for the Marquis Massimi in illustration of the poems of Dante, Tasso, and Ariosto, while similar works in the Vatican were entrusted to other members of the fraternity.

Gradually there was formed in Rome a new school, which, though ridiculed at first for its peculiarities, soon acquired renown and attracted students from all parts of Germany, and even from France some young *éleves* of Gros and David. Overbeck, the founder of the school, remained faithful to Rome and her art traditions. Religious dissensions, however, served with other causes to dissolve the fraternity, some of whose most distinguished members were carried off by Ludwig of Bavaria, to assist in executing the works with which he had resolved his capital should be embellished. To this band of men we owe the renaissance of the art of fresco as well as of encaustic painting, a renewal of the alliance which has always subsisted between the arts of painting and architecture in the periods of their highest development, and a series of works, many of which in their peculiar forms of excellence have never been surpassed. It was in connection with this revival that the first regular and systematic researches were made into the processes of painting followed by the old masters. Not that the matter had previously been altogether ignored either in theory or in practice. Every artist who rose to eminence had, of course, his own method, the result of careful experiment and research. Sir Joshua Reynolds, with fatal and praiseworthy perseverance, had tried in succession, or in combination, all the processes (except perhaps fresco) which had ever been used in painting. During the latter half of the eighteenth century the obscure descriptions of Pliny and Vitruvius, with the treatises of Heraclius, Theophilus, and Cennini, had excited attention and caused no small amount of discussion on the Continent of Europe as well as in our own country. Numerous methods of encaustic painting, original or founded on those described by Pliny, had been suggested. The text of Heraclius and Theophilus, copied from the Cambridge MS., was published in 1781 by our countryman Raspe, along with a treatise in which he endeavoured to prove that oil painting was known and practised centuries before the invention of Van Eyck. The subject, however, was then treated rather as interesting to the antiquarian than as practically useful to the artist. But since the revival of monumental painting by the Bavarian School, the subject has assumed a new phase. The ancient MSS. we have named have been translated into all languages, and have found hosts of commentators, while there has been absolutely a deluge of literature as well on the fine arts as on the technical processes through which they find expression. We will not pour out on auditors who may have no means of protecting themselves against such an infliction, a cataract of authors' names, with the titles of the books which it might be necessary to consult in order to obtain an accurate knowledge of this subject; but, at the risk of repeating what is no doubt familiar to many, we must say a few words as to the measures which have been taken to introduce monumental painting into England. The appointment in 1841, of the "Select Committee to take into consideration the promotion of the fine arts in this country, in connection with the rebuilding of the Houses of Parliament," will probably be found to have inaugurated a new era in the history of English art. Little attention, comparatively, had been previously given either by our artists or architects to the value and capabilities for mural decoration of the various vehicles used in painting. The arts of fresco and encaustic painting were altogether unknown amongst us. Our artists were contented to work on in the two vehicles of oil and water, with which alone they were familiar. These seemed to fulfil all the conditions required for their easel pictures, to which their art was, and indeed still is, almost exclusively confined. But it was now necessary to decide which was the best process to be adopted in the decoration of the Houses of Parliament. Many persons well acquainted with the history and technicalities of art were examined by the commission, Cornelius, the veteran fresco painter, was brought from Germany to give his advice, and the general testimony being in favour of fresco it was resolved to adopt that method of painting. No doubt we shall find differences of opinion, both as to the wisdom of this decision, and the success which has attended the attempt to introduce into England this, to us, novel method. It is well known that fresco is best suited for large figures and for distant effect. It may be argued, with some show of justice, that the process has not got fair play by being employed on comparatively small subjects, and in corridors not more than ten or twelve feet broad.

But whatever may be thought on this point, and he would be a bold man who would state dogmatically his individual views in opposition to the unanimous judgment of the Commissioners, there can be only one opinion as to the conscientious care, the untiring diligence, and the unflinching zeal, which the Commissioners have exhibited in the performance of the difficult task allotted them. In the twelve reports presented to Parliament during the nineteen years over which their labours have extended, will be found a compendium of almost all that is worth knowing on the mechanism of art. Shakespere has stated somewhere, as the highest characteristic of a witty man, that he was not only witty himself, but the cause of wit in others. We may justly apply a paraphrase of this eulogium to the eminent man who has acted as Secretary to the Commissioners, and who has consequently borne the principal part of the labour and responsibility. Having, by the aid of his pencil, gained the highest reputation in his profession, he now endeavours by his contributions to the literature of the Fine Arts, and of their technicalities, to indoctrinate his countrymen with a knowledge of the principles and practice through which the great schools of painting have risen to eminence. Twenty years ago it would have been no easy task for a student in this country to acquire a knowledge of the processes of painting followed by the various schools; but at the present day one scarcely requires to travel, for such an object, beyond his own language. In order to shew that a knowledge of this subject is within the reach of any one who wishes to acquire it, we need only refer to the "Materials for a History of Oil Painting," and "the Contributions to the Literature of the Fine Arts," by Sir C. Eastlake, the works original and translated of Mrs. Merrifield, those of a similar character by Professor Sarsfield Taylor, the translation of Theophilus, by Mr. Hendrie, with his valuable notes on the same, the Reports of the Commissioners on the Fine Arts, the full discussions contained in the various reviews and journals of the period, and principally, among these, to the brilliant analysis of the whole subject, given by Mr. Digby Wyatt, in the "Dublin University Magazine." Had Sir Joshua Reynolds lived a century later, and availed himself of the mass of information which would thus have been brought within his reach, many of his most precious works might have been saved, for the numerous fatal experiments which he instituted on vehicles and other materials of his art, would have been avoided. We should have found among his notes no such recipe as that which he appears to have followed in painting the portrait of Miss Kirkman, "gum dr et whiting, poi cerata, poi ovata, poi verniciata et retouched;" nor the instructive commentary on the fatal result which he chronicles in the one emphatic word "cracks." He would have known, what indeed one marvels he did not know, that work painted first with gum tragacanth, then covered in succession with coatings of liquid wax, egg size, and varnish, could hardly escape destruction, the hard drying qualities of the outer coating being almost certain to cause the whole mass to crack from the surface to the canvass.

We come now to consider the processes themselves, which we shall discuss, as well with reference to their employment in the work, which in these days is generally allotted to the Decorator, as in that which belongs to the Historical Painter. These processes are—

1st. Oil Painting.
2nd. Tempera.
3rd. Gum colour.
4th. Encaustic.
5th. Fresco buono.
6th. Fresco secco.
7th. Water glass.

Oil, maguilp, or varnishes, being the vehicles most in use, and it may be presumed most in favour, among English artists, are unquestionably,—in their results,—the most highly esteemed by the public, who are with us the chief patrons of art. There is manifested a decided preference for the varnished surface—the usual accompaniment of oil painting—which, probably, it might take some time and a more familiar acquaintance with works finished in a different style to overcome. Irrespective, however, of this glossy surface, which may be imparted to works executed by a different process, oil possesses certain qualities as a vehicle which render it a favourite as well with artists as with their patrons.—1st. It has this advantage over fresco and tempera, that the effect of each part of the work is seen as it is executed, for the colours do not get lighter in drying as they do in these two methods. 2nd. Oil as a vehicle, admits of a blending and gradation of tints attainable by no other process. 3rd. Oil painting admits of a force in the shadows which can be matched only in the encaustic process, and that at the expense of other important qualities, while it possesses a clearness and transparency which cannot be attained in any other vehicle whatever. On the other hand, however, it is obnoxious to several fatal objections. 1st. All colours mixed in oil are liable to become yellow, and as the change is greater in the lights and demi tones, than in the shadows, it is destructive of the chiaroscuro as well as the harmony of colour. 2nd. The shining surface, which is the usual accompaniment of oil painting, causes the subject to be lost whenever the eye comes within the angle of reflection. 3rd. All oil vehicles are less or more liable to crack. 4th. Certain colours, which are of value in the encaustic mixtures, cannot be used in oil. Montabert states this last mentioned fact as a strong recommendation of the encaustic method; but from the extensive scale of colours which oil admits of, we may presume that the objection has not much weight. The three first named are more important, and must have been felt strongly by every one who has walked observingly through a picture gallery. Montabert, although in favour of bringing a slight polish on encaustic pictures, by means of wax varnish, denounces the employment of the resinous varnishes generally used on oil painting, and on this point quotes a long passage from Bachelier, of which we shall translate a portion. He says;—"In presence of the most beautiful pictures one gives to regret the moments one ought to give to admiration. A detestable glitter advertises one that he stands before a canvass. Its equal effect on the distance and on the foreground contradicts the aim of art and the intention of the artist. The coloured space is presented to the eye in I do not know how many minute portions which affect it in a manner strange and confused. One would say, at certain points, that it is the surface of an agitated fluid, on which plays a trembling light. If it should happen that the light strikes on a polished part, it is there reflected and the rest plunged into obscurity. One must twist himself, so to speak, into all possible attitudes, to seize the points which are beyond the favourable light. Such a picture is nothing but a mass of shining spots enclosed in an ornamental gold border." He then goes on to speak of the effect of varnishes on the picture itself in destroying the colours,—in sometimes causing the surface to crack or shrivel,—and of the other familiar evils consequent on the use of unctuous vehicles, particularly of what he considers the utter destruction of the work when it requires to be put into the hands of the cleaner. All these evils are to be avoided, he considers, by the use of the encaustic method.

This glitter of the varnished surface is rendered the more obvious and obtrusive when the painting is executed on the wall or ceiling, and not on stretched canvass. No plastering is free from blemishes, and which the mat surface conceals, but which the gloss renders glaring and offensive. An example of the bad effects of painting in oil on such a surface may be seen on the ceiling and walls of the staircase and entrance hall of Marlborough House, which are covered with representations of the Duke's famous battles. Nor can the difficulty be got over by using stretched canvass, for if the frame is large, the tension of the cloth will vary with every atmospheric change. The ceiling panels of the banqueting hall at Whitehall afford a case in point, the canvasses of which hang down to such an extent that the work is altogether spoiled.

Among the French, oil painting is almost universally employed for domestic decorative purposes, and is not wholly abandoned even for monumental painting. The Hemicycle of Paul de la Roche, in the Academie des Beaux Arts, the greatest monumental painting, perhaps, ever executed in France or elsewhere, is in this vehicle. This case, however, can hardly serve as an example for imitation. The position of the Hemicycle, with reference to the light which falls upon it, is such that the eye of the spectator can hardly come within the angle of reflection; consequently, inequalities of the ground, if any exist, are not perceived, and the view of the subject is not lost through the gloss on the surface.

The importance of adopting a mat surface for all such work is sufficiently proved by the vast numbers of excellent pictures in the side chapels of churches, and in other similar positions, which no one can see under ordinary circumstances.

The disadvantages resulting from the glossy surface are not so marked when it is used for arabesques, and those other ornamental works which come within the province of the decorator. For this several reasons may be assigned.

1st. These works do not profess to tell any particular story, so the same discomfort is not experienced when a part of the subject is lost through the reflection.

2nd. In pictures the whole surface is painted over, generally loaded with colour, and in course of time varnished; so, in order to prevent cracking or shrivelling, it is essential to have the materials homogeneous throughout.* But ornamental painting is not exposed to the same risk; the artistical work does not cover the whole surface; it is rarely loaded with colour to the same extent, or coated with varnish; and

3rd. In pictures the whole surface must either be mat or glossy†, while decorative painting may be done in mat on a glossy ground, or *vice versâ*.

In such work, the important point is to prepare the ground with a material which will not change colour by exposure. In a London atmosphere the grounds generally used for this purpose soon lose all resemblance to their original colours, and the value of the work is depreciated in a corresponding ratio. It is, however, quite possible to produce a durable highly polished surface, even in white which will not change much, and on which figures or arabesques painted in mat produce a very pleasing effect from the contrast between the qualities of the two surfaces.‡

Tempera. We need not occupy time with a description of a familiar operation like that of tempera painting, or of the materials employed in it. All works on painting abound in recipes for the preparation of the vehicle. These recipes are altogether unnecessary at the present day. No compound can excel for ordinary distemper painting, the clear size manufactured by the London makers, a little soap, to prevent the rapid absorption, being added by the artist who cannot handle his brush with sufficient rapidity. But parchment size and Russian glue are equally good. Perhaps the latter as it can be used in a more diluted form may offer some advantages over the others I have named. Almost all pigments may be used in tempera except white lead, which in this vehicle, has a tendency to become black. The tempera method enables the artist to produce a force and depth in the shadows unattainable in fresco, and was, indeed, almost universally employed by the great Frescanti to touch up and finish their works, for the purpose of imparting those qualities which fresco could not supply. The system of painting in tempera is the most ancient in existence, and though its use is now abandoned for easel pictures, as well as for monumental work, it remains to this day the most universally employed for merely decorative purposes. It serves the savage for the adornment of his person with those streaks of blue and yellow which he thinks so becoming. It coloured the sculptures of Nineveh; it decorated the temples of the Egyptians; it painted those pictures of Apelles, Zeuxis and Parrhasius, which formed the triumph of Greek pictorial art. Numberless exquisite specimens of early Italian art executed by this process have descended to us. We may reckon, perhaps, as the most ancient pictures in this material, such works as the so-called portraits of our Saviour, which are attributed to St. Luke, and are frequently to be met with in Roman Catholic countries. It is not necessary to have faith in the authenticity of the likeness, or to wait for their identification as the genuine works of their reputed apostolic author, before believing that they are of the highest antiquity. Tempera and its rival encaustic were superseded for monumental painting in the early centuries of the Christian era, by mosaic, which for a lengthened period reigned with undisputed sway. The revival of encaustic was reserved for modern times, but tempera continued to be employed in connection with fresco for the purpose of supplementing its defects so long as that art was practised, and alone for the painting of easel as well as for monumental pictures, until the invention of Van Eyck drove it from the field. If bad puns were permissible in an Institute of Architects, one might say that the old axiom of tempora mutantur is here falsified, for tempera pictures have changed less in colour than similar works executed in any other vehicle. Their durability is, however, due in a great measure to the varnish used on all the early examples, which renders them liable to be mistaken for encaustic paintings. Every where tempera is now abandoned in the case of easel pictures. In our own country its use is confined to the painting of scenic representations and panoramic views.* For these purposes it is peculiarly fitted, from its luminous qualities, from its preserving its colour unchanged although removed from the light, from the loading it admits of in work which is only to be looked at from a distance, and from the crisp effect which it produces. But throughout Italy and Germany tempera is almost universally employed for ordinary domestic decoration, and it will be found that the styles in use have acquired certain peculiarities from the nature of the material in which they are carried out. As language—the vehicle of thought—which derives its characteristics from the peculiar genius of the people who created it, reacts upon and modifies the very ideas which it conveys, much more the vehicle employed in decoration asserts a power over the art of design, and stamps on the styles to which it is applied a character essentially its own. The decorative art of a country cannot be considered as a manifestation of the peculiar genius of a people, apart from a consideration of the medium through which it finds expression. The modern decorations of the various countries of Germany and Italy are distinguished by certain features partly common to them all, features which are due in a great measure to the employment of tempera. The artists of southern Italy seem to rest on the traditions of the past, and nothing is to be there found in merely decorative art, but repetitions of the designs of times gone by. In the north the ordinary tourist may not fall in with many examples of modern decorative art which he may consider worthy of notice. Even the artist who travels with professional views may have difficulty in getting access to those houses where the best examples are to be found. When successful in doing so, he may, if severely critical, feel more disposed to condemn than to approve. Certain it is that in the art of drawing the decorative artists of Northern Italy are very deficient. The Minister of State, who in 1856 superintended the artistical education of Piedmont, showed me some sets of drawings lodged in competition for a mastership in the capital, which it would have disgraced the most elementary schools in this country to produce. But the Lombard school of decorative art, essentially barocca, as it must be allowed to be, possesses many redeeming qualities. Deficient in the refinement and elegance of the French,—of which indeed the vehicle employed and surface painted upon would scarcely admit,—abounding in what seems to us the most absurd and heterogenous combinations,—it displays a vigorous originality, a boldness of design and execution and a breadth of treatment to which the other is a stranger. Scrosotti, the decorative painter at present in greatest renown among the Milanese, and Montanari,* with other men of less note, have stamped on the Milanese decoration a character which renders it well worthy of study and attention. The existence of such a school as we describe is due, in some measure, to the form necessarily adopted in the construction of the apartments. The large covings found in most of the rooms in Northern Italy, which call into play the inventive powers of the artist, and afford at the same time space for the exercise of his skill, are not *intended* for ornament merely. They are a constructional necessity, arising from the want of large timber, and are actually used to cover the struts employed in all cases to shorten the stretch of the joisting, which in Lombardy cannot easily be procured of sufficient strength.

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* If a soft material is used on a hard under-painting the surface is apt to shrivel; if the opposite course be taken, the hard surface put on a soft ground, the work is apt to crack.

† The author is aware that one or two English artists have endeavoured, by the use of an absorbent canvass, to draw the oil out of the lights, and thus keep them mat, for the purpose of securing them against change of colour, while they obtain the desired clearness and transparency of the shadows by scumbling, and glazing, and thus finishing them with a gloss. These exceptional cases do not invalidate the rule stated in the text.

‡ Much of the beauty of the Pompeiian decorations is due to this effect. There is a good example of the style in the hotel of M. Milliaud, the banker, in Paris; a house which is liberally shewn to visitors. Many also may have seen the Pompeianum at Asschaffenburg, which is decorated throughout in this manner. I refrain at present from entering on the subject of the processes followed in executing the Pompeiian painting, for two reasons. 1st. To treat it satisfactorily would extend my paper beyond reasonable limits; and 2nd. I am still engaged with experiments on the nature of those processes, which differ essentially from any that are used at the present day. I have no doubt I shall succeed in producing facsimiles of Pompeiian work, by means identical with those which were used by the Pompeiians.

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* I can recollect only one important easel picture in tempera by a great living English artist. It was painted some thirty years ago as a design for tapestry, by Mr. Dyce. The subject—the Judgment of Solomon—is surrounded by an ornamental border, and the whole composition, in treatment as well as execution, has impressed itself on my memory as a perfect specimen of art.

The development of the peculiar style of manipulation which prevails is due partly to the nature of the tempera vehicle, and partly to the quality of plaster on which the work is executed. The rough surface of the latter would admit of no process except tempera or fresco secco, while it encourages the bold free treatment already referred to. Throughout Germany, similar causes have produced similar results. Although the styles of decorative painting used in Berlin, Dresden and Frankfort, for example, possess certain individual features by which they may be distinguished from each other, still the quality of the tablet on which the work is executed, and the nature of the vehicle employed, have imparted to them all certain common characteristics. In Frankfort, through the influence of the Lombard school, a great change and improvement have taken place within the last ten years. This has been effected chiefly by Herr Umpfenbach, a man of decidedly original talent, who, with the wandering spirit by which all German workmen seem to be animated, found his way, while a student, into Northern Italy. He became embued with the spirit of the school in which he studied, and with discriminating taste has imparted its best qualities to the decorative art of the city, where he now exercises his profession.

We cannot dismiss this subject without a word on the art of decoration as practised in Munich. There the tempera vehicle has in a great measure been superseded by encaustic, and the indigenous forms of ornamentation have been supplanted by styles of foreign growth. Not happily, for in the search after novelty, purity of taste seems to have been lost, and the art has sunk under a debauchery of colour. The embellishments in Munich are all, as the Germans themselves in other parts of Germany would describe them, "zu unruhig," producing—instead of that quiet *healthy repose*, which is the result of an harmonious and happy disposition of colours—*nightmare.*

The coloured arabesques to be found in Munich, and indeed throughout Germany, are painted as if they had been studied from iron models, and are quite deficient in the juicy freshness which is found in the naturalistic French school.†

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* Montanari painted the ceiling of the Austrian Court in the Great Exhibition of 1851, a work which may be referred to as a fair example of the style.

† The pilasters, which were painted some twenty years ago, in the side gallery of the old Pinacothek, and which are published along with the decorations of the Bibliothek, are a fair example of German arabesques. In 1860 these pilasters were being repainted, and I have no small curiosity to see what style of ornamentation has been substituted.

If present effect alone were to be studied, tempera would leave nothing to be desired as a medium for most kinds of decorative painting. But with all the advantages it offers, it cannot be recommended for general use in this country, particularly in towns where the atmosphere is so impregnated with the fumes of coal fires and gas. We have a fatal objection to its use in the fact that it does not resist moisture, and cannot therefore be cleansed by washing. In those countries where tempera is the ordinary vehicle for decorative painting, such work costs but little at first, and from the clearness and dryness of the atmosphere lasts a lifetime. But with us, all artistical work is so costly, and is exposed to so many destructive influences, that it ought to be executed in the most durable of materials. No doubt the tempera process will always remain a favourite one with all artists who have used it, but except for simple and inexpensive decorations, or for the ceilings of country mansions, it cannot be recommended to those with whom economical considerations have any weight. Various attempts have been made to produce a washable tempera. One system, patented under the name of Kalsomine, consists in washing over the work when completed with a solution of alum. This method has also been applied to paper hangings, but it has never come into general use. The application was not sufficiently binding, for although a surface treated with it might be gently washed, it could not stand that thorough scrubbing which is necessary to restore a stained and smoke begrimed wall to its original purity. It will, therefore, I consider, be found better to finish, where tempera is used, without any such attempt at protection, and trust to cleaning with bread when such an operation becomes necessary.

Caseum may either be classed among the tempera vehicles, or may have a separate place assigned to it. Unlike all other kinds of tempera, it is insoluble in water after having once hardened, and some may therefore think it entitled to a separate place. In order to make the size, take new cheese or curd of cheese, and work it well with the hand in tepid water, until the fat has been all expressed, strain through a cloth, retaining the thick part for use. Grind in water six parts of the cheese with one part of lime, and the mixture when diluted is ready for use. Yolk of eggs thoroughly beaten up with a very little water and fish glue may be added. This size will keep for a few days only and cannot be remelted after congelation. A prescription similar to the above is given by Professor Taylor in his "Manual of Fresco and Encaustic Painting." That which I have used, I procured from Signor Mantovani, who is now engaged in restoring the old and in decorating the new Loggie of the Vatican. In restoring the Loggia dei Zuccheri, the first on which he was employed, he used the encaustic gluten elemi diluted with oil of spike, the palette being kept hot, and the cauterium being also employed for the heating of the walls. He has since finished one of the new bracci in fresco buono. At present he is engaged on the braccio of the celebrated Giovanno da Udine, and he has received the Pope's orders to restore the primo piano. Signor Mantovani intends to use in all subsequent works the "colla à formaggio," or cheese size, which he finds produces exactly the effect of fresco, and which he expects will be equally durable. If caseum be reckoned among the tempera vehicles, then we must reverse the verdict which has been passed on them. The only reasons I can discover why it should not come into general use are the trouble of making it frequently, and the expense, which of course greatly exceeds that of any ordinary size. But in artistical work the expense of the size is not important, and the admirable qualities of the vehicle under discussion will repay any little extra trouble that may be incurred in its preparation. Caseum may be used either with lime or zinc as a basis for the colours. The binding principle is, no doubt, the same as that which exists in milk, a liquid I have seen employed in country places for the whitewashing of kitchens, and other similar purposes, where milk was cheaper than glue.

The third medium which I have to notice—gum colour—will not detain us long. It is composed of white lead or zinc ground in turpentine, bound with clear gum copal, and tinted to any hue that may be required. This material retains its purity, and is much clearer in tone than the ordinary flat paint of the house painter, which always contains a certain admixture of oil. The qualities possessed by gum colour render it useful for the plain painting of ceilings and cornices, on the latter of which the use of distemper ought to be avoided from its effect in destroying the sharpness of the enrichments. The harmonious colouring of an apartment if done in common flat paint, is frequently spoiled by a change in the tone of the ceiling or cornice when placed alongside of a paper hanging which may have remained unaltered, or which may have changed in the opposite direction.

For artistical decoration, gum colour possesses many of the good qualities of tempera, with the addition of durability, but it is more difficult to handle owing to the rapidity with which the turpentine evaporates. It will be found useful, however, for ornamental painting, in some cases when one has to work with German or other artists accustomed only to distemper, as the style of manipulation for both vehicles is similar. Painters in distemper will be able to use gum colours, after a very few days' practice, as freely as the vehicle in which they have been accustomed to paint. As gum colour, however, does not admit of blending, it is unsuited to figure painting, and must therefore be restricted in its use to arabesques, grisaille ornament, and subjects of a similar kind.

Encaustic. The encaustic, or as now practised, more correctly termed the wax process, is the next on our programme.

The art of encaustic painting, like that of distemper, can trace its origin to a remote and distinguished ancestry. If wax did not serve in the days of the Ptolemies as a vehicle for the decoration of the mummy cases and for other similar purposes, it was certainly used as a varnish for binding the colours. The knowledge of its use was in all likelihood transmitted to the Greeks, along with that of the other arts which they acquired from the Egyptians. Until recently, a species of mystery seems to have hung over the name. Blaise de Vigènere translates the word by the phrase "peinture en email," and the idea of encaustic painting carried out by means of fire, seems always to have been associated in his mind with the use of vitrifiable substances, enamelled by exposure to the heat of a furnace.* Even subsequent to his time, dictionaries continued to give a similar explanation of the process. It is now well known that the term is derived from the employment of fire or heat for the inustion or fusion of the colours, but of course no great amount of heat was necessary to soften the wax which served as the vehicle. The word encaustic, by a process of which numerous examples exist in all languages, lost its original import in the course of time, and came to be employed in a sense which had no reference to the source whence it was derived. Probably about the period when encaustic painting, in the hands of the Byzantine artists, was superseded (so far as it was applied to mural decoration) by mosaic, the illumination of manuscripts became a fashion, and the term, no longer required for a style of painting which was falling into disuse, was appropriated to the new art. As writing and painting in those days were synonymous terms, pictures being the books of the unlearned, encaustic came to serve for the name of the materials employed, as well in the illuminating, as in the writing of the MSS. Hence, the inchiostro of the Italians, l'encre of the French, and the ink of our own language.

Pliny describes three kinds of encaustic work as having been in use among the Greeks, only one of which, however, can be correctly called painting. For this process the wax was liquefied by some means or other, the nature of which is not known.† The liquid thus obtained is supposed to have been employed as a vehicle, the colours being mixed in it and laid on with brushes. The picture when completed was then exposed to the influence of heat by means of a cauterium or brazier, which served by semifusion to soften and blend the colours. Probably this operation assisted the artist in procuring the necessary gradation of tint, which with the imperfectly liquefied wax, and in the then rude state of the arts, he could not produce by more legitimate means. Of the other two methods, one seems to have produced a species of mosaic, in which coloured wax was filled into a shallow intaglio, cut into ivory or other suitable substance. The second of these two was executed with wax of different colours, by means of metal instruments kept heated for the purpose, and must have resembled modelling more than painting.

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* Montabert Traité Complet de la Peinture, v. 8, p. 527.

† Count Caylus suggests three methods : 1st. By means of heat, the painting being executed on heated tablets. 2nd. By beating the wax with a spatula until reduced to very fine particles, after which it would not again become solid. As a 3rd method, that the grounds or tablets only were prepared with wax, the painting being executed in weak tempera, a method which Weigmann proves to be the "Kansis" of Vitruvius, a mode of wax varnishing and not of wax painting. Fabbroni tries to prove that the solution was effected by means of an essential oil. Bachelier and others, by a lixivium, so as to render the wax soluble and workable in water.

The questions involved in the discussion of these methods may be left in the hands of antiquarians and artists whose attention they have engaged. Of these Montabert names no less than twenty-five, and it would be easy to add nearly as many more to the list. In the early centuries of the Christian era these methods of encaustic as well as the art of such fresco painting as had been previously practised, seem to have been entirely superseded in the case of mural decoration by that of working in mosaic, the style of ornamentation which forms a distinguishing feature of Byzantine architecture. Nor was encaustic painting revived till after the lapse of centuries. Although during the middle ages preparations were probably used in painting, of which wax formed a material ingredient; it was more as a varnish for the protection of pictures executed in tempera or fresco secco, than as a vehicle in which the colours were mixed. But this is a point on which there are considerable differences of opinion. Montabert says that Italy offers "une foule de peintures," which afford indices useful for explaining the methods of encaustic painting among the Greeks. Mrs. Merrifield, on the contrary, speaks of a picture of the Martyrdom of St. Simon the younger by Andrea Mantegna, which she saw in the collection of Signor Vallardi, of Milan, as one of the very few genuine mediæval wax pictures known to connoisseurs. Wiegmann says we do not possess one genuine example of antique encaustic painting. He asserts that every ancient work supposed to be done in this method has been proved, on a fair test, to be either in fresco or tempera. He concludes, therefore, that among the Greeks and Romans, encaustic executed by means of brushes was used for plain painting only, and then as a preservative from the weather. The art of encaustic painting found its renaissance within our own times in Munich, where for thirty years past it has been extensively used for decorations and pictures of all kinds, with the exception of religious subjects, which are specially reserved for fresco. The chief apostle of wax painting in France is M. Montabert, who in his "Traité complet de la peinture," while he dismisses fresco in eighteen pages, devotes no less than one hundred and thirty-five to his favourite system. He refers to various processes of encaustic, advocated by other artists and investigators as those employed in ancient times, and in addition describes a method of his own, for which he claims the merit of originality, and which, having used it extensively in his own practice, he naturally prefers to all other systems of painting. In France the method got into discredit through some failures which were made in the first attempts to make use of it, but the bad effect of these initial difficulties has been overcome, and this system of painting has been gradually extending its influence among our neighbours. The method recommended by M. Montabert, which was the one generally followed at the revival of the process, is nearly that which we have already described. The wall on which the encaustic painting was to be executed, was heated to about 100 degrees of Fahrenheit, by means of a cauterium. It was then coated with successive layers of the mixture until it became thoroughly saturated. The ground was afterwards prepared with the requisite colour, and the painting when executed was passed over with a wax varnish. Heat was again applied as already described, as well between the various paintings as after the finishing coats of varnish were laid on in order to amalgamate the mass; when the surface was gently rubbed with a linen cloth until a slight polish was produced upon it. All these difficulties and complications have been got rid of in more modern practice; the system of encaustic painting being seldom adopted unless to produce the mat surface, for which the heating and the final coatings of wax are unnecessary. The mixture generally used in Munich is composed of bleached wax, gum dammar, turpentine, and nut oil; and is employed in precisely the same manner as the oil vehicles. No special preparation of the ground is required. The painting may be done on wall, wood, or canvass. It is, indeed, not unusual to execute the first painting in oil and reserve encaustic for the finishing merely, and that for the purpose of getting rid of the glossy surface.* In France the best encaustic mixtures,—styled glutens,—are prepared by M. Duroziez, chemist, and author of the "Manuel de la peinture en cire."† M. Duroziez makes no less than nine different liquids to be used in connection with the wax painting, all of them useful for various purposes. For pure wax painting, he supplies what he calls Gluten Elémi, in which the colours are ground, and gum copal or elémi dissolved in oil of spike, to be used for the working. But a more substantial style of painting, still with a mat surface, is produced by employing the gluten elémi as a vehicle for ordinary tube colours ground in nut oil. This method is to be preferred for work in an exposed situation, as it stands a certain amount of friction without getting a gloss, a quality which pure wax painting does not possess.‡ H. Duroziez' mixtures are so far superior to the Munich vehicle that they do not set so fast, and allow, therefore, of a more perfect blending of the colours.

We have mentioned that encaustic painting is now seldom used except for the purpose of procuring a mat surface. It will be observed, however, from M. Montabert's recommending the use of the cauterium and a final coating of wax varnish, that he prefers the work to be finished with a gloss. "Most critics," he says, "who object to the lustre of pictures, forget that the cause which prevents them seeing the picture in all lights is the cause of the beauty of its colours. In truth," he continues "wax polished, and applied in several thin coats and rendered quite transparent by a slight rubbing, produces this diaphonous effect sufficient to give force to the deeper colours, without the disadvantage, at the same time, of offering on the surface of the picture the obscuring lustre and the lively and obtrusive glitter which is produced by coats of resinous varnish. The polish produced by wax is moderate, soft, and never offends the retina." In Bavaria, notwithstanding the general employment of the encaustic process, we have seen but one instance of its failure, *i. e.* in the Pompeianum at Aschaffenburg, and that failure is easily accounted for. The walls are of scagliola, and on the hard polished surface the painting seems to have been executed without special preparation. It could not therefore be expected, in any circumstances, to adhere very tenaciously. However much we may regret the destruction of the beautifully painted figures, no one who considers that the apartments are exposed to the severe winters of central Germany, can feel surprised to find that the colours have started from the walls.§

Fresco painting (the sixth on our list), as its name implies, and as every one knows, is executed on the wet surface of the plaster, so much only being plastered at a time as will suffice for a day's painting. The difficulties attending such a mode of working are obviously great. The numerous joinings in the intonaco, which no amount of care can render invisible, the limited scale of colours admissible from the effect of the lime in changing their hues, the necessity for completing each small portion of the work daily, the rapid execution necessary from the hardening of the plaster, the allowance to be made for the change of the moist colours in drying, and the nicety required for matching the tones of those parts already completed, form a mass of difficulties which it requires no ordinary talent and skill to surmount. Although most of the great works of the Italian school have been executed in fresco, it can scarcely be considered in itself a perfect art. It was found in almost all cases necessary to supplement the want of force in the shadows, and other defects, by retouching with crayons or tempera. The Caracci, it is said, were the only fresco painters who could dispense with these adventitious aids, and execute their pictures from first to last in fresco pure and simple. The same defect seems to attend the system since its revival in modern times. M. Fortoul, who was in Munich while Cornelius was engaged on his great picture of the last judgment, says that after being finished in fresco by his pupils, it was entirely repainted by himself in tempera. Cornelius had found that his first frescoes executed in the Glyptothec were crude and harsh, and in attempting to avoid those faults in his later works he fell into an error of the opposite description. Not being able to judge of the effect of the painting until the whole was completed, he tried to rectify the second error by an entire repainting, so that this work, so much admired as a fresco, is no fresco, but in reality a tempera painting. Fresco buono is not well adapted for merely ornamental decorative work, except where the spaces are small enough to be finished in one day. It is almost impossible, in plastering, to follow the sinuosities of the arabesques and other forms of which decorative work consists, and where the joints of the plaster are allowed to run across the flat plain surface of the wall, they form a blemish which no skill can render inoffensive. Probably the farther practice of fresco in this country will be arrested by the recent discovery of the stereochromic process, which possesses all the advantages of the ancient method, with many others from which it is excluded.

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* Such a method, however, can scarcely be recommended, as it involves a loss of time. It renders necessary a repainting of the whole work, whereas an artist who knows his business will so treat his subject that a great part of the first painting will not require to be gone over again.

† Published in 1844.

‡ Gluten Taubenheim, one of M. Durozriez's preparations, worked with copal à l'essence, serves the same purpose.

§ I shall be glad, if I am wrong on this point, to be corrected by any one who is better informed. I did not make a minute examination, but formed my opinion from the appearance of the work, that the ground and the vehicle employed for the painting were such as I describe them to be.

The fresco secco process is assumed by most modern writers on the subject to have been the only style of fresco in use until near the close of the fourteenth century. In preparing the ground for fresco secco the plastering is all executed at once and allowed to dry. It is then soaked with lime water and painted on while moist, lime being used as the basis for the colours. Mr. C. H. Wilson mentions that fresco secco is still extensively used in Munich and the north of Italy for decorative purposes, and that painting executed in Munich by this method is washable. The system is also referred to by various authors, some of whom have apparently only restated Mr. Wilson's assertions, as being equally durable with fresco. It has not been my fortune to meet with many examples of fresco secco, nor have I, in my experiments, succeeded in making it washable, as the Müncheners are said to do. In fact, it is only useful for the painting of grisailles. When the lime is applied pure, or nearly so, to the moistened plaster of the wall, it adheres with tolerable tenacity, but even the brightest lights made with pure lime do not stand washing. In proportion as colour is added the mixture becomes, of course, less adhesive; and it must be obvious that a dark colour having no lime in it at all, and therefore no attachment to the plaster, may be dusted off when dry. These facts sufficiently prove that whatever may have been the process followed in the decorations of Pompeii and Herculaneum, it could not be that of fresco secco. The hypothesis that the work was protected by a wax varnish scarcely suffices, because it is difficult to understand how, without size of some sort, the dark colours could be rendered sufficiently adhesive to withstand the application.

There now remains to be noticed the last-named method in our list, that of stereochromy, or the silicate of potash, or water glass process. It is now nearly forty years since Professor Fuchs called attention to the supposed capabilities of water glass as a means of binding colours for mural decoration. So far back as 1825 he published a small work on the subject, but it was many years before the discovery obtained, even in Germany, the consideration which it deserved. Foreign artists naturally in such circumstances either disregarded the invention, or remained in entire ignorance of it. The knowledge of such discoveries travels slowly, and it is long before they become naturalised in foreign countries. Men are unwilling to abandon one art, in the practice of which their lives have been spent, in favour of another whose superiority remains to be proved, and in which they can scarcely hope to acquire equal dexterity. The art of stereochromy also, as first described by its inventor, seemed of a somewhat complicated nature, while the technical chemical terms, and the involved sentences in which his book abounded, were sufficient to frighten any one from its study unless he had a fair knowledge of chemistry and of the German language. In addition to these obstructions to the introduction of the system among English artists, there remains the important fact that there is so little demand in this country for that class of painting to which stereochromy is peculiarly applicable. Without some special object in view, it could scarcely be expected that any one would take the trouble of acquiring the art. But these initial difficulties have been overcome. The proposed decoration of the Houses of Parliament supplied the motive, and the appointment of the Fine Arts Commission the means. A searching inquiry was instituted by the Commissioners as to the best modes of painting used in ancient as well as in modern times, and the information thus acquired was communicated to the public through the reports already so often referred to, which were furnished by them to the Houses of Parliament. Two works descriptive of the water glass method were translated into English by the late Prince Consort, and copies sent to all the artists of note in Great Britain. The attempt has at length been made, and the great works of Mr. Maclise and Mr. Cope, in the House of Lords, afford triumphant proof, patent to every one, of the merits of the process. There can be little doubt that if monumental painting, or mural decoration of a high class, is ever to be much practised in England, the stereochromic method will be used in preference to the ancient fresco.

The tablets for painting on in the stereochromic method are generally prepared in the first coatings as in ordinary plastering. The finishing coat, or intonaco, is composed of lime and river sand, the latter material being used in larger proportion than for common work, that the surface may be sufficiently porous. It has been usual in Germany to finish the surface with a very rough grain, which is not only unnecessary but appears to be a serious blemish. The roughness serves not merely for the collection of dust, but it prevents the equal distribution of the colours in the execution of the painting. Neither is a smooth surface desirable, because as it is less absorbent, the colours do not hold so firmly of themselves, nor does the water glass exercise so much influence in permanently fixing them. If a granulated surface could be procured like that of the twilled canvass sometimes used for oil painting, it would, I think, be the most pleasant to work upon, and would fulfil most completely all the conditions required for the use of the silicate. But although the nature of the grain of the plaster is not so important, it is essential that the surface should be uniform throughout, not only for the sake of the painting, but for the fixing. A rough portion of the surface will, of course, absorb much more of the liquid before it is sufficiently saturated, and it may not have received enough, while a smooth portion, refusing to imbibe any more, may allow the liquid to run down and spoil the painting. Unless, however, for subjects of a very light tone of colour, I should prefer Portland cement to mortar as a ground. It is not so liable to crack as common mortar, a risk to which the tablets are especially exposed, if used on moveable frames. The vehicle used for painting is simply distilled water, in which also the colours should be ground. It is usual to moisten the cement or plaster while the painting is in course of execution. This serves the useful purpose of preventing the colours from drying too rapidly, and assists the artist in matching the parts of the work already executed; but it does not seem to be essential to success if the artist can work with sufficient speed.

Professor Fuchs gives elaborate instructions for the preparation of the ground, and says it is necessary that each layer of mortar should be saturated with the water glass before the succeeding one is put on, and that the intonaco should also be soaked and allowed to dry before the painting is commenced. Not only do these precautions seem altogether unnecessary, but the last seems actually hurtful. In every case where I have seen an attempt made to repaint any portion of the work after the water glass was applied, the colour has come off in scales. The fresh coatings of silicate applied for the purpose of fixing the retouched parts do not seem to attach themselves to the hardened coats beneath. I allude to this the more pointedly because it is stated in the twelfth report of the Commissioners on the Fine Arts, as well as by Professor Fuchs himself, and others, that "the picture, even after being fixed, admits of being retouched and carried out to any degree of finish that may be desirable." The water glass is applied by means of a syringe, which in expelling the liquid divides it into a fine spray or vapour. It thus moistens the painting so gradually that, with moderate care, there is no risk of the fluid running down and carrying the colours with it. But the greatest care and attention are otherwise requisite in the application. If the fixing fluid is used too strong or applied too liberally a bloom is brought over the surface, and the picture is unduly darkened. Such an injury is the more serious, as the shadows are more easily affected than the lights, and the picture is therefore not equally darkened throughout. From a knowledge of this fact, artists are apt to err on the side which seems to them the safest, and to leave the colours without being properly fixed. Such an error it may be thought can be rectified at any time.* The silicate, as supplied by the makers, may be diluted with from two to four times its bulk of distilled water, according to the strength, which varies very much. After the first or second coating, applied by the syringe, the colours will be sufficiently bound to allow of the other coats being laid with the brush, a method which will always be preferred when it can be adopted with safety, as well from its greater rapidity as because it allows of the liquid being applied to those parts of the surface which require it the most. Some colours are much more easily fixed than others, and my observation would lead me to say the lights are more easily fixed than the shadows. Whether this arises from the greater affinity between the silicate and the zinc which is used for the white I do not know. Probably it may arise from the simple fact, that the zinc is less absorbent than the earths which form the bases of so many of the pigments, and that the flinty fluid, not being allowed to pass through into the mortar, hardens on the surface. Certain it is that the necessity for further coatings ceases with the porosity of the cement, and each additional coat put on afterwards simply adds a thin sheet of glass in the form of a dull glaze to the surface. I will not hazard an opinion as to the nature of the chemical change, if any, which takes place in the water glass when applied to the picture. A full discussion of this point, which concerns the chemist more than the artist, will be found in Professor Fuchs' pamphlet. Some have supposed the binding quality to be due to the combination effected between the alkali and the sand contained in the mortar. I wish it to be observed, however, that the silicate will fix colours on plaster, cement, wood, stone, brick, paper, or in fact on almost any substance. The fixing property therefore cannot be due to chemical action taking place on contact with sand. But taking for granted the existence of the substance liquid glass, which becomes a solid on being exposed in thin layers to the atmosphere, by the evaporation of the water it contains, or by the separation of the silicate from the potash which holds it in solution, the question, without any knowledge of chemistry, seems easy of comprehension. Having, in its liquid form, penetrated and become incorporated with the colours as well as with the mortar, it forms along with these, in becoming solid, a siliceous mass impervious like any other glass to moisture, and offering an effectual resistance to all atmospheric influences.

It is now eight years since I first experimented with water glass, but it was only after a recent visit to Munich, where I saw the process in operation and had it fully explained by Herr Schulze,* that I succeeded in having it turned to practical account. Of its applicability to the best class of domestic decorative painting, although hitherto it has not been tried on a large scale, there can be no doubt. The only difficulty I have experienced, is in producing a solid uniform surface of a light tint where the space is large. With such pigments as black, red, or with any colour of which one coat is sufficient to cover the ground, there is comparatively little trouble; but with light tints a second coat may be necessary, and this it is somewhat difficult to apply. Unless the first coat is fixed, it is apt to work up in laying the second, and give the surface a cloudy appearance. If fixed with a strong solution of the silicate, the subsequent painting, as I have already stated, is apt to scale off. The remedy is to use the water glass much diluted, and to lay the second coat of colour with a gentle hand, so as to exercise the least possible disturbing influence. The want of force in the shadows is a defect to which stereochromy is obnoxious, in common with fresco secco and fresco buono; but not by any means to the same extent, The amount of this defect may be measured by comparing with the originals some copies which I have made from portraits by Kneller and Sir Peter Lely, at Hampton Court. The style in which these pictures are painted is the most of all unsuited for such a process. If, then, it emerges from so searching an ordeal with a fair amount of credit, or even without absolute failure, the new system may be considered to be established as a great success.

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* I saw in 1860 some pictures in a church at Brussels, executed by M. Portals in the stereochromic method, and I have seen one picture in this country, by Herr Götzenberg, a German artist, who was for some time resident in London, in all of which the colours were softer and more easily removed than they generally are in a distemper painting.

The PRESIDENT, Professor DONALDSON, then invited discussion upon the very interesting subject that had been brought before them; and called upon Mr. Crace to give his views to the meeting.

Mr. CRACE, Contributing Visitor, was scarcely prepared to enter upon the discussion of a paper of such length, and which introduced so many subjects. But he was happy to avail himself of the opportunity to express the pleasure with which he had listened to the lecturer, and to convey to him his thanks for a great deal of information he had given them, as well as for the beauty of the works he had exhibited. Respecting the different mediums of which he had spoken, he (Mr. Crace) had certainly formed his opinion that few of them were superior to oil painting. Beginning at tempera, which he thought possessed many useful qualities, although, from its not being washable, it was merely of a temporary character, they came next to the encaustic. He did not know whether Mr. Purdie had met with the same difficulties as he had, but he had found that it did not wash well—that the waxy surface, when dirt once stuck to it, was like washing the surface of a wax candle—the more they washed it, the dirtier it became. He thought, also, that when exposed to external influences, it was apt to peal off. It was very much to be wished that fresco would succeed, especially for grand subjects, intended to be seen at a great distance. Certainly it possessed luminous qualities far superior to oil. But any one who had seen oil and fresco executed about the same time in the same building, must confess that oil shewed more of the work of the master, after an interval of 300 years, than any fresco works. At the present day, in the palace of Fontainebleau, there were many remains of the frescoes of Primaticcio, and of the oil paintings executed about the same time. The frescoes in the Gallery of Francis I. were in a ruinous state, while the oil paintings still conveyed the meaning and intention of the artist who executed them, though not perhaps with the same brilliancy as at the first. There were some chambers there, executed in the time of Louis XIII., about 50 or 60 years after the time of Francis I., where the pictures in oil were in a perfect state of preservation at the present time. With reference to the water glass, he thought those who theorized or practised should bear in mind this one strong fact, that there was no material more acted upon by the water glass than simple common whiting. Soft as whiting was, becoming indented by the least mark of the finger, it became almost like marble when the water glass was applied. The effect of the water glass upon this material was far stronger than lime. It seemed to fill up a desideratum, to give it a binding quality. Now the great thing was to find a vehicle for whiting without the combination of size, and in discovering that, perhaps they might make an advance upon the present system of water glass. He could not say that he was very much impressed with the material, in reference to its use by so great an artist as Mr. Maclise. He considered the cartoon of the great picture of "La Belle Alliance," in the Houses of Parliament, far preferable to the coloured picture. That picture by no means possessed those luminous qualities which he had expected it would possess. The great thing in this country was to consider the influences, particularly in London, of the climate. In fresco painting it was necessary to bear in mind that they had the carbonic acid of our smoky atmosphere, which flew to the lime in preference to almost anything else. The lime actually drew it out from the air, so as to very materially affect the surface, both in blacking it, and in his opinion disintegrating it. Therefore, however brilliant and useful this fresco decoration might be, if it was not of a permanent kind, the sooner they realized that fact the better. Upon the whole, he thought he had seen no effects produced either in fresco or by the water glass, which could not be obtained with nearly, if not quite an equal brilliancy by a judicious application of turpentine with a little mixture of varnish. In reference to pictures, the great thing to be considered was, whether, in gaining perfect flatness and perfect evenness of surface, the depth of the shadows and the richness of the colouring were not materially sacrificed. He begged to apologize for these very disjointed remarks. He was quite unprepared to take part in the discussion. He had just returned from a long journey, but hearing the subject of the paper, he thought he would come and listen to what took place.

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* Herr Schulze was the painter of the picture referred to by Sir C. Eastlake as having been shewn to him by Professor Pettenkofer, of Munich.

The PRESIDENT said this was certainly one of the most interesting subjects that could be treated in connection with architecture, because that art depended very materially for its effects upon the aid that it might derive from pictorial embellishments. In this country mural painting was almost a fresh introduction, and therefore we had had no opportunities afforded us by experience of testing which processes would be the most expedient. But those who had been abroad, and particularly at Rome, would have seen the superiority of the fresco painting over oil; and in the Vatican itself there were examples which would distinctly shew this. When they considered the Transfiguration of Raphael, one of the sublimest pictures of that school, and when they saw the opacity of that as an oil painting, and noticed how much the browns predominated, being deprived of the delicate last tints or glazes which were given to them, they must be convinced that oil paintings did lose much of their beauty and force, which could not be restored unless it be by the painter himself, and he having passed away, no sacrilegious hand should be allowed to touch them. But when they saw upon the walls frescoes, which seemed almost in their primitive beauty and transparency,—when they saw the most delicate of colouring of that great master—for he held that Raphael was one of the greatest colourists that ever lived—they must acknowledge that fresco carried the palm over oil; and when they recollected how many centuries had elapsed since those productions issued from the genius of the painter, it afforded them an opportunity of judging between the one and the other. But there were still more ancient examples, as in the baths of the Romans, where they also saw the superiority of fresco as a permanent means of decoration. They could go back above seventeen centuries, and in the baths of Titus—or, rather, not so much the baths, as under them, in the subterranean halls of previous thermæ—the frescoes presented a degree of freshness and beauty which was surprising. Mr. Purdie had alluded to the paintings upon the walls of Pompeii, remarking, that when they were first disinterred, they presented a freshness, which they lost after a short period; so that, in seeing them at the present time, there was a great deal of opacity, darkness, and want of that transparency which illuminated pictorial representation. Their friend, Mr. Digby Wyatt, got a distinguished foreign artist to come over here for the decorations of the Pompeian house at the Crystal Palace, and certainly he was successful in the manner in which he treated those works. They were not merely fresco, but he employed other mediæ in order to produce effect. This Neapolitan artist worked in the style of the ancient paintings, and he (the President) believed that in the Crystal Palace he had produced the most perfect imitations of them, and they must give him credit for having overcome very great difficulties. In this country there were various disadvantages against which to contend, such as the atmosphere, which had been alluded to by the lecturer and by Mr. Crace. In order to overcome these, they must expect that a great many years must pass away in experimentalizing. They should not be discouraged, but continue to try what processes would best answer under the various circumstances of the case. They were unfavourably situated in this country, from the limited manner in which mural painting was adopted. Abroad it was seen in every church, palace, or other large buildings. In Italy it was common. If they went to Lombardy or the Venetian States, there they found the walls of the houses carried out to an astonishing extent, and they had been treated with success, so far as regarded the materials employed. They were very much indebted to the lecturer who had brought forward this interesting subject, and who had so very carefully divided it into different sections, pointing out not only the difficulties, but some of the modes in which they can be overcome. He recollected about 40 years ago, when Overbeck and Cornelius were at Rome, painting those beautiful pictures at the Casa Bartoldi, he saw the whole process, and the energy with which the Germans battled against every difficulty, in order to become masters of a new art, and that without any reward beyond that of success. He thought, however, it must be confessed, that at Munich, where it had been carried out to a great extent, it had failed. In the gardens and various exposed parts of that city the frescoes were vanishing away. It was much to be hoped that in this country we should find out some process that should be enduring. He felt that the allusion made by Mr. Crace to the beautiful picture in the House of Commons was just, but they must not be impatient. He trusted that those who were now at work would succeed in presenting works which would do honour to the nation and to the enterprize of the artists themselves.

Mr. SEDDON, Hon. Sec., wished to ask Mr. Purdie whether almost all the mediæval paintings in churches were not in tempera? There were numerous remains still extant, as those discovered in the crypt at Canterbury; indeed, it was well known that the interiors of the ecclesiastical buildings of both the Norman and Gothic styles were almost universally covered with paintings, and some churches in Norway still retained them complete, and had been ably illustrated by M. Mandelgren in a recent and fine work. In this country they have been generally destroyed, and fragments alone remain here and there to attest to these having once existed in profusion. Their destruction, however, is due less to the effects of the atmosphere than to violence and whitewash. Wherever they had been preserved, they seemed to retain pretty well their primitive colouring. The other day he (Mr. S.) was examining those in Canterbury Cathedral, where they had been subject to damp and such disadvantages to an unusual degree, and yet they retained apparently their original tones of colour, resembling exactly those given in the plates of M. Mandelgren. If that were so, it seemed to him a sad pity that they should not continue so very simple and durable a process, and one which afforded many advantages not possessed by any other of those that had been described.

Mr. WHITE, Fellow, thought that a great number of the paintings in the old English churches were in tempera, but that many others were executed by some process which we knew nothing at all about, as the colour seemed to have sunk into the surface of the plaster in a way quite distinct from that in which tempera was laid on common plaster, and they did not seem to have suffered at all from within the wall, as almost all modern tempera painting did. He should be glad to know whether the glass process was safe from damp within the wall, because that seemed to be of almost greater consequence than damp from without, almost all plaster in this country being subject to change of weather and different kinds of stone.

The **President**, addressing Mr. Purdie, said he did not think he had explained some of the specimens on the table before him.

Mr. **Purdie** said they were specimens shewing the mode in which he believed the decorations of Pompeii and Herculaneum had been carried out. He was hardly prepared to explain them fully, as his experiments on the subject were far from being complete. At the last meeting of the Institute, Mr. Lightly showed some small samples of Pompeian stucco, which were precisely similar to those which he (Mr. P.) had produced. Some other specimens referred to by the President were prepared by the water glass and fresco processes, to test, 1st, which colours were best adapted for these processes respectively; 2nd, which of the two processes produced the brightest colouring; and 3rd, how much the water glass changed the colours after it was sprinkled on the picture. This part of the subject was perhaps too technical for a meeting like the present; but he would be glad to shew these specimens, and explain them privately to any one who was interested in the subject.

Professor **Arthur Herbert Church**, Visitor, said he had devoted nine years to the chemical aspect of this question, as involved in the stereochromic process. In the year 1856 Mr. Barlow was lecturing at the Royal Institution upon the application of silica, and he assisted him at those lectures, and prepared some of the specimens. Since then he had made various experiments with silicate of potash and silicate of soda. He was also employed as chemical adviser with respect to the paintings at St. Alban's Church, Holborn, which had been painted after designs by Mr. Lestrange according to the water glass process, as modified by himself (Professor Church), and which were generally thought successful as specimens of architectural wall paintings, though they were more properly ornamental designs than finished works of high art. They were perfectly fixed, having been washed with hot water and scrubbed. It was only in a chemical point of view that he wished to say a few words. They prepared the silicate of potash with great care, avoiding the presence of sulphate of potash. He was inclined to think that many of the failures were owing to the badness of the material, which might be good enough for fixing whitewash, but not for paintings. Instead of white zinc, they used whiting for the basis of the various colours, and it answered admirably. Some of the high lights were put in with zinc white, and they also were successful. He should say the wall was stone, and stood at a distance of several inches, perhaps a foot, from the real wall of the church, so that there was an air space between. The stone was ground to a tolerably smooth surface, and by means of lime the inequalities were filled up. A simple wash of water glass was applied to the prepared surface before painting upon it, whilst the colours were mixed with distilled water only. The wall was moistened with lime and water, and it had the great advantage of fixing the colour so as to bear the brush, although it wanted gently handling, He had determined the colours that should be used, and the exact composition of the silicate of potash best adapted for fixing the painting when finished. He should be glad to give any further information to the Institute, if requested to do so.

Mr. **C. F. Hayward**, Hon. Sec., remarked that Munich had been referred to more than once that evening, and if any gentleman present had been to Munich since he (Mr. H.) was there ten years ago, he could probably tell the Institute what condition the pictures were in which were then in the process of painting on the outside walls of the new Pinacothek. On visiting that city as a student, it surprised him much to see the immense difference in the appreciation that there seemed to be of decoration generally in that city and any in England. The great idea exhibited in our buildings seemed to be that of baldness or ugliness, which was being "plain and substantial" in the language of some men.

At the comparatively small city of Munich, on the contrary, everything seemed to be built with a view to its being perfected to a certain extent by architecture decoration. But what astonished him most was the quantity of the pictorial decorations in outside walls, cloisters, and arcades, as well as in the churches, especially in their new Picture Gallery, which was then being completed. At that time a great deal was being said of the water glass procees, and of pictures which had been painted in this manner at Berlin, so that now sufficient time had elapsed for an opinion to be formed of its durability.

Professor **KERR**, Fellow, had always understood that water glass had the serious defect of absorbing moisture from the air; and if so, there must soon be an end of this process of painting. The hardening of a soft substance like whiting, by the application of silicate of soda, must be very temporary, especially in a climate like ours. This application was no doubt at first supposed to indurate stone. This was the form, he believed, in which the use of water glass was originally recommended by Fuchs; but if moisture were to be absorbed, the ultimate result must be the promotion of decay rather than the reverse; and this, he had understood, had proved to be the case—at least in a moist climate. The substitution of silicate of potash, he believed, was an improvement; but it seemed desirable in this discussion, that the actual facts of this part of the case should be before the meeting, and perhaps Mr. Church would be so kind as to explain them.

Professor **CHURCH** said the hardening process did not take place at once, but occasionally was not complete till a year or two. The colours of which he had spoken had stood the test of sulphuretted hydrogen and weak acids. He considered the process a permanent one, and that the pictures painted by it became more fixed the more they were exposed to atmospheric influences. With reference to silicate of soda and the preservation of stone, Mr. Church agreed with the preceding speaker's remarks. In a well-known process in which silicate of soda was used, 40 per cent. of common salt of the dry materials used was thus made and introduced into the stone, with what fatal effects architects and builders would be able to predict.

Mr. C. H. **SMITH**, Hon. Member, said that some years ago he had tried a few experiments, and observed in the silicate of potash process, that there were little loose specks, not perhaps more than a tenth of an inch wide, but they came out, and seemed to bring a bit of the plastered material with them. Whether such defects would go on increasing or not, he could not say. There was also a certain amount of dampness. The method of preparation was this: there was a definite quantity of sand put into water with a certain quantity of potash, and boiled together; when cold, the substance became of a gelatinous consistency, and then it was washed on. He had had conversations with different persons on this subject, and Sir Charles Eastlake wrote to him to know if he could give him his sentiments in writing. He did so, and Sir Charles printed those writings in his Parliamentary report.

Mr. **CHURCH** thought the silicate of which Mr. Smith had spoken was not that now used, but the silicate of soda, or the small crystals would not have appeared.

Mr. **PURDIE**, like Mr. Crace, had no special love for the encaustic method. The vehicle is troublesome to use, and pure wax painting, as Mr. Crace observed, does not wash well. But a considerable quantity of nut or poppy oil might be added to the mixture without making it glossy, and with such an addition it would wash quite as well as oil paint, while it keeps the colour much better. Mr. Purdie had no intention of passing any opinion either favourable or the reverse on the artistic value of the work of Mr. Maclise which had been referred to. He (Mr. P.) had quoted it as an example of the successful application of a technical process. But as this question had been broached, he might say he had recently studied this picture somewhat carefully, and was not surprised to find that the President of the Institute, as well as Mr. Crace, preferred the cartoon to the finished work. While it displays many of those excellencies for which Mr. Maclise is famous—great power of invention of drawing and grouping—it exhibits some of his defects in an exaggerated form. It is heavy and opaque in colour, and deficient in aerial perspective. The artillery in the background seems as if it were suspended in the air right over the heads of the groups in the foreground. But faults of this kind could not be fairly charged to the silicate of potash. Mr. Cope's picture—the Defence of Basing House—also in water glass, is placed among his frescoes, and therefore affords an excellent opportunity for comparing the merits of the two systems. Mr. Purdie considered that most connoisseurs will prefer Mr. Cope's water glass picture to any of his frescoes. As to the comparative durability of fresco and oil painting, Mr. Purdie apprehended that Mr. Crace's opinion would be found to be at variance with the almost universal belief on the subject. This matter had been so thoroughly ventilated, that he (Mr. P.) would not discuss it at length, but would content himself with one or two remarks on the subject. In doing so, he would also endeavour to answer the gentleman who had asked a question as to the protection which water glass afforded against interior damp. There are three sources to which damp is due: 1st. Capillary attraction; 2nd. Condensation in the interior surface; and 3rd. Infiltration. The first is the most destructive to all subjects which come within its influence, because it is the most constantly in operation. Pictures however are seldom placed in such positions as to suffer from this cause. Against the second the water glass is a perfect security. Neither water glass nor fresco paintings are better secured against internal damp or condensation than oil pictures, but they are perhaps rather more secure against that which percolates through the walls. The more impervious to damp a wall is made on the face, it will be the more liable to suffer when attacked in the rear. Through such a surface as that of fresco water may pass without utter destruction to the picture, but it can escape through an oil painted wall only by the entire removal of the paint. Mr. Crace had suggested the existence of carbonic acid gas as a cause of the destruction not merely of paint but of plaster. There seemed to be no doubt among chemists of its action on the former, but he (Mr. P.) had always understood that it was in a great measure due to the carbonic acid gas which the lime absorbs from the atmosphere, that it becomes indurated. So that, if Mr. P. is correct in this supposition, instead of acting as a destroyer, this gas is actually the substance to which mortar owes its solidity and durability. Much discussion had taken place in the Houses of Parliament and elsewhere as to the causes of the decay of the frescoes in the Palace at Westminster. Mr. Purdie considered that a combination of causes may have been at work. The lime for the first frescoes may not have been carefully prepared, the pictures may have been touched up with tempera, or the intonaco may have been too dry before it was painted on. Mr. Purdie referred to one of Mr. Herbert's frescoes—one of the best of the whole series—King Lear disinheriting Cordelia—where he fancied he could recognize that the last-named cause had been at work. But the great damage it could scarcely be doubted had been caused by damp passing from the exterior through the porous stone. In many places which Mr. Purdie had noticed, the damp had also thrown off from the stone mouldings which form the frames of the pictures the oil paint with which they had been coated. It should be recollected, however, that the durability of colour was quite as important as that of the substance of the pictures; but as the President had illustrated very clearly the comparative disadvantages under which oil painting labours in this respect, he (Mr. P.) would not occupy time by dwelling on it. It ought to be recollected, also, that there is a third really important question, as between oil painting on the one hand, and those processes which are used for producing a mat surface on the other, which had not been alluded to by any of those who had joined in the discussion—What is the use of a picture if it cannot be seen? An easel picture may be painted in oil, because, if it cannot be seen in one position, it may be removed to another; but the case differs in monumental painting, and to paint a subject in oil which must occupy a certain fixed place may be simply to produce a work which may be invisible. Mr. Purdie had recently visited the Church of Bon Secours, near Rouen, the decoration of which he considered was of the most beautiful description. In the spandrils of the arches of the clerestory were painted a series of figures on a blue ground covered with gold stars. The whole composition was as rich as colours and gold could make it, yet there was nothing to disturb the solemn harmony which reigned throughout. The glitter of oil paint on any part of the work would have jarred on the feelings as an unpleasant discord. Not only so; had the figures in the spandrils, for example, been painted in a glossy vehicle, the sufferings of Tantalus would have been added to the other discomforts of the spectator; for nothing but a painful glitter could have reached his eye from the most interesting portion of the decoration. Mr. Purdie hoped that the description of the various vehicles which he had given, with the authorities he had quoted, might assist in determining the methods best fitted for use in any particular circumstances. But it might be expected that he should not have wound up without drawing some practical conclusions from the matter which had been submitted to the Institute. He would do so in a few words. He was disposed to throw overboard fresco buono *as commonly practised*, fresco secco in all circumstances, and encaustic painting, so far as it is employed for obtaining a glossy surface. On new walls, when the ground can be properly prepared, he would substitute for fresco the water glass process. Where a similar effect is desired on old walls without renewing the plaster, he would recommend tempera carried out by means of caseum. Encaustic might be used instead of caseum by those who do not understand and do not wish to learn the tempera method. By encaustic, pure wax painting was not intended, but a mixture containing a sufficient quantity of oil and resins to render the work washable. Oil painting, with all its faults, Mr. Purdie considered preferable to other methods where a gloss was essential. But he could scarcely imagine a case in which the glossy surface could be considered preferable to the mat surface for monumental painting. In the body of his lecture Mr. Purdie had explained in what respects historical and decorative painting seemed to differ in their requirements, and he would not now recur to the subject. In speaking of discontinuing fresco painting, Mr. Purdie would have to make an important exception, if he succeeded in some experiments in which he was engaged. He believed that the paintings of Pompeii and Herculaneum were true frescoes, although executed by a process somewhat different from that which is followed at the present day. He believed that he would succeed in producing facsimiles of these works by means identical with those which were used by the Pompeians. The result of the process was a hard polished stucco, in which the colour was incorporated, and which he believed to be indestructible by any ordinary influences. The President had remarked on the success with which the Pompeian decorations had been carried out in the Crystal Palace. As might have been anticipated, under the able superintendence of Mr. Digby Wyatt, these decorations had been carried out with perfect success. Mr. P. presumed, however, that no attempt had been made to imitate the original process. The vehicle used in the Crystal Palace was encaustic, and the whole work, both the ground and the painting, are mat. It is not so in the original works. There the grounds are all polished. Mr. Purdie had procured an analysis of the Pompeian stucco at the Metallurgical Laboratory of the Geological Museum, and found it contained nothing except the pigments used for colouring the walls, and carbonate of lime. But he would not enter at length on this interesting question. It seemed to him that the production of a material such as he described would not merely solve a very interesting archæological problem, but might prove of great practical importance in decoration. Mr. Purdie had not seen the paintings in the Crypt of Canterbury Cathedral, referred to by Mr. Seddon. All the paintings of the period when these were likely to have been executed, which he had met with, were in tempera. He had seen several examples in old baronial residences. One he could recollect—a ceiling, very curious and quaint, in Cullen House, the seat of the Earl of Seafield; another, the ceiling of a long gallery in

Pinkie House, near Edinburgh. It was known, however, from numerous entries in public records, that oil was extensively used in England for painting during the 13th and 14th centuries. There are frequent entries for oil in the accounts connected with Ely Cathedral and Westminster Abbey; but there is very little evidence of its being employed for any other purposes than for plain painting, for making varnishes, and as a mordaunt for gilding. He (Mr. P.) knew of no vehicle which was likely to be used at so early a period except tempera. That tempera was employed in the case of those two Cathedrals is rendered the more probable from the fact that the same accounts contain numerous entries of payments for eggs, which might be used in the preparation of the vehicle. Mr. Purdie would refer all who felt an interest in the history of oil painting to Sir C. Eastlake's valuable work, which contained, he believed, all the available information on the subject.

In reply to Mr. HAYWARD, Mr. PURDIE stated he had recently seen the pictures on the exterior of the new Pinacothek in Munich. They are not executed in water glass, but in fresco, which those who liked such decorations might regret, because they are not likely to be durable. Mr. Purdie, however, could not see any trace of decay as yet. He, however, for one, would the less regret the decay of these works, as he considered paintings altogether misplaced in the position which they occupied.

The thanks of the meeting were then voted unanimously to Mr. Purdie.

SESSIONAL PAPERS

OF THE

ROYAL INSTITUTE OF BRITISH ARCHITECTS,

Incorporated in the Seventh Year of William IV.

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Patron . . . HIS ROYAL HIGHNESS THE PRINCE OF WALES.

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1864.

PAPERS

READ AT

The Royal Institute of British Architects,

SESSION—1863-64.

USUI CIVIUM, DECORI URBIUM.

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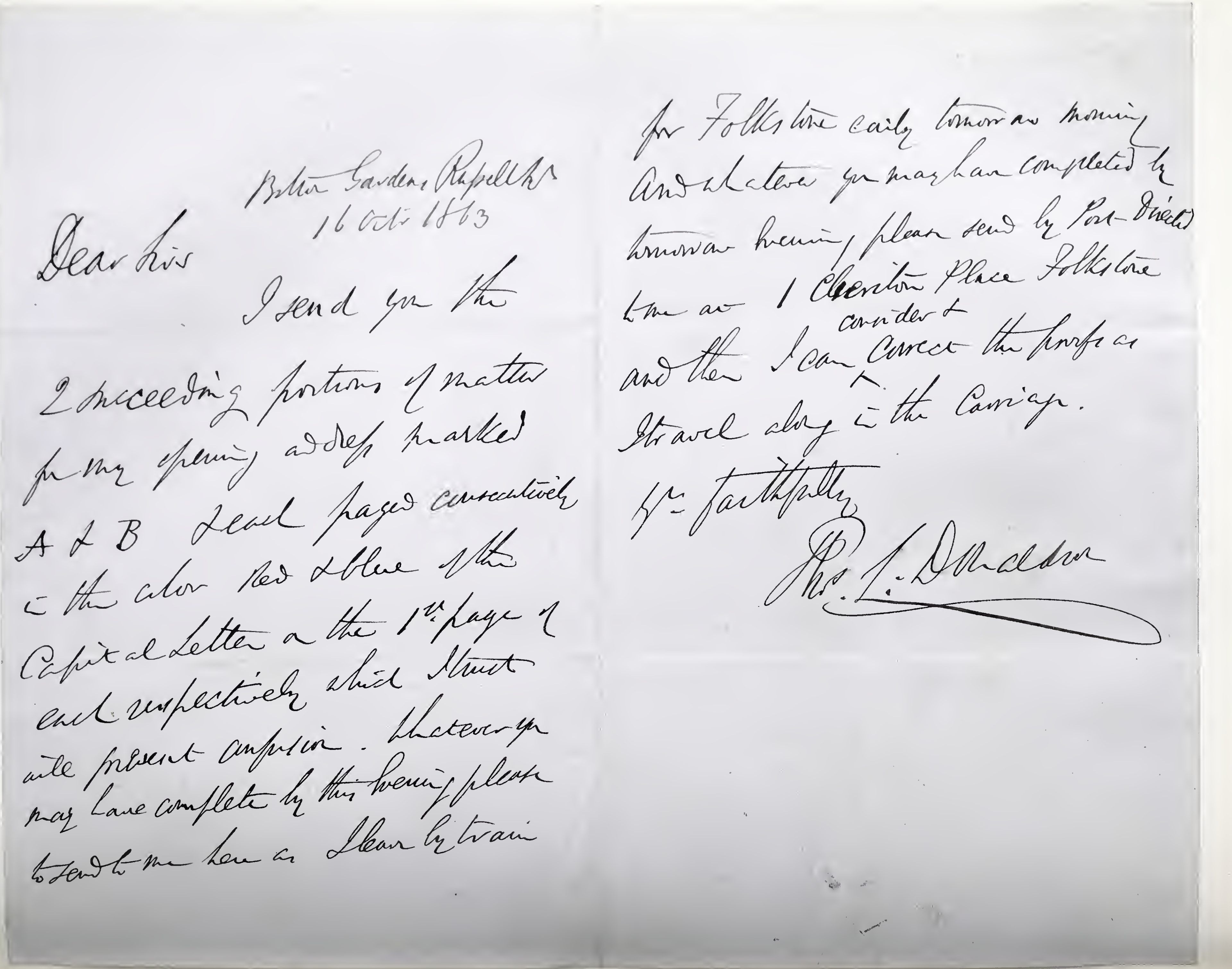
TABLE OF CONTENTS.

TITLE.	AUTHOR.	DATE.	PAGE.
Opening Address	By Professor Donaldson, President.	Nov. 2nd, 1863.	1 — 15
Some Account of the Professional Life and Character of the late Professor C. R. Cockerell, R.A., Fellow and late President R.I.B.A.	By Sydney Smirke, R.A., Fellow	Nov. 16th, ,,	17 — 26
Chronological List of Designs and Drawings by the late C. R. Cockerell, R.A.	…………	……	27, 28
Notes on Newland Church, Gloucestershire, with Remarks on Church Restoration and Arrangements.	By William White, Fellow.	Nov. 30th, ,,	29 — 42
A few words in favor of the Decimal but against the Metrical System of Measurement; and an endeavour to show how all the advantages of the Metrical System may be obtained without giving up the English Standards.	By F. C. Penrose, M.A., Fellow.	,, ,,	43 — 47
On the Improvements of Paris, and their Cost.	By W. Tite, M.P., F.R.S.	Dec. 14th, ,,	48 — 62
A Discussion upon the Paper relating to the Improvements in Paris, and upon Railways and Street Communication in London.	…………	Jan. 4th, 1864.	63 — 76
On Hydraulic Lifts	By John Whichcord, F.S.A., Fellow.	Jan. 18th, ,,	77 — 90
Discussion upon Mr. Penrose's Paper in favor of the Decimal but against the Metrical System of Measurement.	…………	Feb. 1st, ,,	91 — 96

TITLE.	AUTHOR.	DATE.	PAGE.
On Iron, as a Building Material.	By G. Aitchison, Fellow.	Feb. 29th, 1864.	97 —107
The Sky-line in Modern Domestic Buildings.	By A. J. B. Beresford-Hope, F.S.A.	Mar. 14th, ,,	108 —120
A short Description of the Working Drawings of the New Opera House now building at Paris.	By Professor Donaldson, President.	April 4th, ,,	121 —123
Some Account of recent Discoveries in the Hourân, and in the Country about Aleppo and Antiocheia.	By Professor Donaldson, President.	,, ,,	124 —129
Some Remarks upon the Works of the Early Mediæval Architects, Gundulph, Flambard, William of Sens, and others.	By Benjamin Ferrey, F.S.A., Fellow.	April 18th, ,,	130 —146
On some Examples of Mural Painting.	By the Rev. Edward L. Cutts.	May 16th, ,,	147 —154
An Account of the Repairs at the Temple Church.	By J. P. St. Aubyn, Fellow.	,, ,,	155 —158
Report of Committee appointed for the purpose of making Experiments on Artificial Stone, with Appendix.	....	May 30th, ,,	159 —168
Some Observations upon Experiments on Artificial Stone, by Octavius Hansard, Fellow, with Discussion.	....	,, ,,	169 —181
On certain Early Romanesque Buildings in Switzerland and the neighbouring Countries.	By Edward A. Freeman, Hon. Member.	June 13th, ,,	182 —201



Bolton Gardens Russell Sq
16 Octr 1863

Dear Sir

I send you the 2 succeeding portions of matter for my opening address marked A & B & each paged consecutively in the color Red & blue of the Capital Letter on the 1st page of each respectively which I trust will prevent confusion. Whatever you may have complete by this evening please to send to me here as I leave by train for Folkstone early tomorrow morning And whatever you may have completed by tomorrow evening please send by Post Directed to me at 1 Cheriton Place Folkstone and then I can consider & correct the proofs as I travel along in the Carriage.

Yrs faithfully

Thos. L. Donaldson

OPENING ADDRESS BY THE PRESIDENT,

At the Ordinary General Meeting of the Royal Institute of British Architects, November 2nd, 1863.

Gentlemen,—Even within the few months, which have passed since we met in this room, several events have occurred interesting to us as a body, interesting to us all individually. I shall therefore trespass upon your patience for a short time, as I pass in review some of the more important topics connected with our Profession.

In the first place it is due to a great man, who has recently passed away from us, to notice the death of our distinguished Fellow, C. R. Cockerell, R.A., our first Professional President, and the first member whom you honored by your choice, in the award of the Royal Gold Medal. It is not for me to anticipate, what we may ere long hope to hear read at one of our meetings, a full and complete memoir of our departed Friend. Nor shall I repeat what has already been aptly said of him in various journals. But perhaps I may be allowed shortly to notice somewhat of my own personal impressions during an intimacy, and I am proud to say a friendship, of above forty years standing. Mr. Cockerell's earliest professional experience was under Mr., now Sir Robert, Smirke, in whose office he was during the few months in which the late Covent Garden Theatre was being built. Here he had the most favorable opportunity of acquiring a knowledge of Architecture, as that building was considered at the time a masterpiece of conception and execution in its structural details; and his taste must have been refined by the elegant and chaste artistic decorations of the interior, which were a theme of admiration to all lovers of the art. He then proceeded on his professional travels through Italy, Greece, and Turkey, preceding me by some years; but the remembrance of him was still fresh in the memory of many friends I made there, and his praise was the constant theme of all. His handsome person, his clear blue eye, his pleasing expression, and graceful manner, a taste the most refined, a varied and extensive knowledge of Art, his free and masterly style of drawing, his genial generous disposition, irresistibly won general admiration, and he was considered the type of a polished and gifted Architect. His presence in Greece threw him entirely into the society of foreigners desirous to win his friendship, and he as anxious, with a modest consciousness of deficiencies yet to be supplied, to avail himself of their experience, their researches and their superior attainments. He was most fortunate in being thrown among such men as Barons Haller and Von Stackelberg, and Herr Link. The first especially was a very advanced Architect, a ripe scholar, perfectly master of Greek art,—and through his counsels Cockerell acquired a deep insight into that peculiar and spiritual mystery of power on the mind, which reigns in the ancient monuments of that classic soil. With these earnest companions, who fathomed the inner soul of every monument of that refined people, he studied, and measured, and drew, and reasoned, and reflected, with joy and love for the subject, and with the patience and fire, which kindled emulation in the whole group. You may well imagine how they investigated the hidden secrets of those historical monuments, connected with the earliest associations of their boyish studies, and with the renown of the heroes and poets, writers and artists, rulers and sages of the classic times. The very soil was sacred to them. Each grove, each rivulet, each mountain and each valley, had its power over their minds, and under that bright sky pursuing their studies, amid such scenes, and in the presence of such inspiriting monuments, you must allow with me, that it must have been the poetry of their existence. They also associated with Gropius the Austrian Consul, and Fauvel the Consul of France, and Lusieri, whose laborious and vivid pencil drew those exquisite views of the Buildings of Greece preserved in Lord Elgin's Collection.

The two Consuls had galleries of choice antiquities, and a quick perception and knowledge of Greek art. Mons. Fauvel especially was endowed with a natural instinct and brilliant fancy peculiarly valuable to the student, qualities rendered more precious still by frank candour and generosity of disposition.

And here I would notice, by the bye, the advantage which the English artist acquires by mixing with his foreign brethren in art. He soon discovers that they see with other eyes and under different impressions the same objects—their mode of appreciation has another rule.—They may perceive beauties or defects, where he finds the reverse. At first he may feel dissatisfied with their judgments, and may think them crude and defective; but when once he can reason with them, and learn their grounds of approval or dislike, he will find that it may not be without some shew of reason, that they may have arrived at conclusions different from his own. They may be right or may be wrong; but he becomes conscious that perhaps he may be biassed, too often by prejudice and by a judgment formed in the school in which he may have been trained, and by the one groove of thought in which the mind may have been accustomed to move, and which may have induced the adoption of ideas, requiring re-consideration and re-modelling ere he can arrive at truth. And he, who is once induced to doubt his own judgment and to reason frankly, is in a fair way of getting at the truth—for his ideas are enlarged, and he is freed from the trammels of bigoted notions as to art. Thus fifty years ago, ere our intercourse was opened with the Continent by the peace of 1816, Mediæval art was called English architecture, it being supposed to have originated in this country and carried to its climax of beauty here: but soon our intercourse with the Continent induced a healthier judgment. Perhaps I may be permitted to add, that Mr. Cockerell and myself have found among our Foreign Brother Artists a readiness to accept our friendship, a liberal and frank interchange of thought, a courteous willingness to supply any information we might require, and to open to us their portfolios or lend us their drawings; in fact, to an interchange of all the social and artistic courtesies of life. And, I am happy to say, that these feelings cannot but be confirmed, if not increased, by the manner in which this Institute has enrolled so many Foreign Architects among its Honorary Members, and sought, by the liberal award of the Royal gold medal to several Foreign men of distinguished merit, to draw closer still the bonds, which should unite in one common accord the Profession throughout the World.

It is from the combination of these circumstances, the association and congenial studies with foreigners, and a readiness to entertain the ideas of others, as also from his ability, when thus enlightened, to acquaint himself with the monuments of antiquity, in fact to acquire a thorough knowledge of the whole range of the sister arts, that Mr. Cockerell was able throughout his career, to advance with the new laws of art brought to light by the researches of successive travellers; to appreciate the fulness of the polychromatic theory; and to hail with generous delight the discoveries and minute investigations in the Parthenon of his friend and successor Mr. Penrose. It is not to be supposed that he needed the counsels and support of his fellow travellers in the whole course of his studies. The delightful illustrations, which he made for the pleasing volume of Beaufort's Karamania, shew how completely he entered into the gorgeous magnificence of the Greco-Roman antiquities of those splendid cities, along the South Coast of Asia Minor. In Sicily also, where our common friend, Raffaelle Politi, who still survives and is one of our Honorary and Corresponding Members, had made the excavations of the Temple of Jupiter at Agrigentum, he composed that fine restoration of the section with the colossal caryatide to the clerestory of the Cella, which I prevailed upon him to publish in the Supplementary Volume of Stuart's Athens. In his beautiful drawings of the Buildings at Pompeii, he displayed with graphic skill the peculiar sentiment and grace of the architecture, sculpture and decorative painting, and revived as it were the domestic life of the Pompeians, with as much facility as he rendered the existing realities of Ali Pasha's Audience Hall at Yanina.

Throughout his whole life architecture was to Mr. Cockerell what Coleridge describes poetry to have been to himself—"Poetry," he said, "has been to me an exceeding great reward. It has soothed my afflictions; it has multiplied and refined my enjoyments; it has endeared solitude and has given me the habit of wishing to discover the good and beautiful in all that meets and surrounds me." So was architecture Cockerell's passion and delight—he followed it not from mere mercenary considerations. He spared not himself to revise, correct and chasten each vivid idea as it presented itself to his fancy, and which he appropriated to his work on hand; he was never weary if he could improve, and anxious for novelty he occasionally transgressed the severe principles of the Antique. In fact, if fault could be attributed to a man of such genius, he was, perhaps, often too fastidious, and occasionally ready to retouch and to adopt a supposed improvement, where possibly the original thought was simpler—wiser. In him the young architect found an encouraging monitor, and one of kindred feeling; ever ready to assist and to discover latent talent. And perhaps one of the most remarkable traits in his character was, that, with all his prepossession for the chaste and simple sublimity of Greek art, he could bow, as before a superior and supreme spirit, to the genius of Wren, whose noble productions are at such variance with the supposed canons of antiquity.

It is a circumstance to be remarked that Mr. Cockerell did not join this Institute as a Member till 1849, that is fifteen years after its foundation. This did not arise from any want of interest in its success; on the contrary, he considered it as most honorable and useful to the profession. But he thought himself bound in honor and by the laws as a member of the Royal Academy not to belong to any other artistic body. Sir Robert Smirke had from the first joined us, but it was as Honorary Fellow. When Mr. Barry, however, then a Fellow of our Institute, was elected a Royal Academician, and did not cease to be a Fellow of our Institute, he felt himself released from the supposed obligation, and at once sent in his allegiance and became a Fellow. I shall not occupy your time further on this interesting topic by analysing the productions of our late friend, his works are before the world, and you are competent to form a judgment yourselves: besides which such a review would require longer deliberation, and that will be given in the more complete biography which is now preparing.

He has been to us an example, while living, as a man of the highest honor, intense sensibility, generous sentiment, refined taste, and deep knowledge of architecture: and may the memory of such noble qualities have its influence upon every generation of his successors, whatever theory they may entertain, whatever style of art they may pursue.

There is still one other consideration connected with the memory of our departed friend. With the gracious concurrence of the Dean and Chapter of St. Paul's, we buried him with the noble and great of the land. Whatever may be the strivings and antagonisms or even jealousies of practical life, as architects we must all feel a just pride in the reflexion, that we have our Barry in Westminster Abbey and our Cockerell in St. Paul's.

Mr. Joseph Gwilt is another of our Professional Brethren, who has died during our vacation. He was a man of superior attainments, as a classical scholar, mathematician, musician, and astronomer, besides his acquirements as an architect. In his earlier professional life he adopted the prevailing passion for Greek art; and here we must not confound real Greek art with its many applications at that time in this country. You may apply the general proportions, the decorations and details of a style, in all the minutest accuracy to any particular building, but unless you adopt also the appropriateness, the fitting sentiment and destination of the original, and produce the same impression and convey the same idea, it becomes senseless imitation, and of course devoid of its proper sentiment. Thus the Greek Doric in its noble proportions was travestied, and that which in a Heathen Temple assumed the impressiveness of a consecrated tradition, proved when rigidly applied to a Christian place of worship or a theatre devoid of propriety and instinctive life. Not that there is one only religious architecture, for there is no style incapable of producing religious impression, and therefore no style can be called profane. The Romans, when they adopted the Greek canons for their buildings, did that with a liberty and grace, which imparted to them individuality of sentiment. The triumphal arches, and the monumental columns and amphitheatres, are evidences of their power of a proper transfusion of feeling to other purposes of existing forms. When the Italians and French in like manner revived the taste of Classic Architecture, they also modified it and imparted to it the charm of an individuality neither precisely Greek nor Roman, as that of the Cinque Cento and Renaissance period, which drew a broad line of demarcation between the type and its free imitations. Hence it is that Greek Art in this country, not having been studied and applied with the like views and similar sensible treatment, failed to maintain the position it acquired under its earliest cultivators, and a noble opportunity was lost of falling back upon the manly, chaste and profound laws in art of the most refined people who had ever existed, and the full and judicious application of which we can never know, for almost all but the Temples of Greece have been destroyed for ages, and we have few records of their other monuments left behind.

Mr G. Tappen who had been travelling in Italy, and who brought home a portfolio rich in the studies of Italian buildings, and the fruits of which he published, returned with a deep admiration of the works of Palladio and his compeers. He imbued Mr. Gwilt with the like feelings, so that henceforth his style was formed on that of the Italian schools with Vignola at their head, and of this predilection a notable instance occurs in the buildings he erected for the Grocers' Company, in Princes Street, opposite the Bank of England.

He was a prolific writer, his works being distinguished rather for diligent research and as useful compilations, than for originality of information or remark. His translation of Vitruvius was a faithful rendering of the received text of the Roman; it is to be regretted that he did not fall back upon the original codices for which his classical attainments peculiarly qualified him, as well as his laborious patience for such researches; or did not adopt Schneider's masterly and expurgated edition of the great master: he accepted the corrupt readings of Jocundus and his followers down to Galliani. The plates are most carefully engraved, but the illustrations do not reflect the majesty of Roman art. His architectural notes upon the buildings of Italy are a very useful compendium for the traveller and student. But his great work was the Encyclopædia of Architecture, containing much practical information, well compiled from various authors. He was consulted by the official department of the Government in re-modelling on the two last occasions the Building Acts of 1843 and 1854. He removed many inconsistencies in the old enactments, and he sought to simplify the regulations by some curious abstract theories superseding useful working data, which are much more easily understood by the practical man. He was a member of this Institute at the first, when his adhesion was very influential, and he assisted materially by his experience and business methodical habit of mind, in drawing up its original constitution: unfortunately some difference of opinion of no very great moment arose, and suddenly broke off the connection. I am happy to learn that his Memoir, written by his Son, Mr. John Sebastian Gwilt, will be read at one of our early Ordinary Meetings.

One of the most important proceedings of this Institute has occurred during the late recess of the ordinary operations of our body. I allude to the prompt and vigorous measures adopted in order to prove to Parliament and to the British Public the impolicy of preserving the Exhibition Building of 1862. As soon as notice was given in the House of Commons, that it was the intention of Government to apply for funds to purchase the Building, and for laying out a still larger sum in order to render it adequate for the purpose of a National Museum for the reception of the natural history division of the British Museum, a meeting was called for by some of the Fellows, and the Council convened, as you know, a Special General Meeting to consider the matter. The Committee appointed to survey and report their opinion, examined the Building and drew up a well digested temperate statement. They abstained very wisely from more than briefly touching upon the æsthetical considerations connected with the Building: and they confined themselves rather to the proofs, that, erected for a special purpose under certain special conditions and to answer a specific end, which they did not deny it might have satisfactorily fulfilled, it would be an unwise measure to attempt to convert it into a permanent building for which it was not originally designed, its distribution being irremediably deficient, its construction unstable, its materials unsound. Consequently that the scheme for its purchase and proper transformation was impracticable and fraught with unprecedented probabilities of discredit and disappointment. This judgment of the highest professional body in the United Kingdom was irresistible; and was indorsed by the House of Commons, who negatived the proposition by an overwhelming majority.

It might have been supposed that this decisive result, supported as it was by the expressed opinion of the whole of Europe "that this Building was a grave discredit to the artistic reputation of England" would have effectually suppressed every attempt to retain it, but some letters soon appeared in the *Times* pleading for its maintenance. In September last, Mr. Adderley, M.P., at the distribution of the prizes at the Stoke-upon-Trent School of Art is represented to have said "that nothing had shewn him more the want of the appreciation of the first principle of beauty in this country than the fact, that the representatives of the people had voted recently for the demolition of the National Exhibition Building. There was of course no disputing about taste, but the vote of the House of Commons shewed that some members were incapable of appreciating naked design without the assistance of ornament. It showed also an old puritanical spirit of disinclination to patronise art. He should look to schools of art for any hope they might entertain for any better building than that which had been so ruthlessly demolished."—The opinion of such a speaker in the face of facts has little effect. The puny efforts to reconcile the inherent defects of taste in the original Building with a facing of so-called architectural embellishments, as exhibited on the walls of the Royal Academy, proved the futility of the idea to give grace and beauty to inherent deformity. And the Institute itself in its petition to the House of Commons broadly stated their "preference for the bare brick wall and the iron skeleton in their rude integrity, as far less discreditable to the country, than any amount of mistaken ingenuity expended in the production of such questionable grace." So far for the attempts of the Member for North Staffordshire to justify the beauty of the Building, and his remedy to be found in the Kensington Branch Schools of Art. It is to be hoped, however, that none will be lulled into the visionary notion that the forbearance of the public or of the House of Commons will endure the maintenance even of a portion of the Building, and that no frantic endeavour will be made, on the score of convenience or adaptability for art, to allow of anything less than the entire sweeping away of the excrescence, which disfigures what should be the finest quarter of the metropolis, so judiciously laid out by H.R.H. the late Prince Consort.

To maintain the high standard of English art and science at a time, when all the other branches of practical knowledge are cultivated with a zeal rich in fruits of the past, rich in hopes for the future, is now the great aim of the profession. But that which strikes the mind, as one contemplates the present condition of architecture, is the remarkable phenomenon of the number of intelligent and gifted architects, who now stand as men of mark before the world, and the fine edifices which British genius has produced all over the United Kingdom, contrasted with the low and apparently neglected state of architectural education up to the present time. And when I say architectural education, I mean the absence of any recognized and adopted system. Here the student is left to his own sympathies, his own inspirations, the suggestions of his own zeal more or less active, and to his unguided experience casually gained in the office of his master, where he can become familiar only with the taste and science of the works there carried out. We do not possess the professional recognized ateliers of the Professor, as in France, where gratuitous courses of lectures also, periodical prizes and grand competitions in the schools, and the stimulating intercourse with well known associates, and the pride of the school keep up the spiritual earnestness of the student to a high wrought pitch of excitement, and nerve him to energetic efforts for eminence and success. On the other hand we have to congratulate ourselves that we have no governmental rigid routine scheme, as in Germany, binding down the taste and study of the youth to one formal line and process of artistic thought. Still, I say, though many of these sources of encouragement and instruction are not available for our young aspirants, yet our profession has produced men of the highest merit, who have entered upon the arena of European competition with the greatest honor, and carried off the noblest prizes even on Foreign ground.

It must be allowed therefore, that the student has had hitherto to labor under great disadvantages, which at length became intolerable, and after many strivings the wants of the younger followers of our art forced themselves upon our attention. The Institute consequently matured a broad scheme of competitive examinations, which points out the branches of knowledge to be studied, and the extent to which they must be acquired, in order to gain distinction. And thus the contest of life is carried on and the benefits are not merely resulting to the individual, but are diffused throughout the whole mass. The success of one fires the ambition, stimulates the ardor, and excites the hopes of his fellows. He struggles on and studies, and perfects also his mastery of drawing. He loses no opportunity of improvement, observes, records, and thus strengthens his mind with materials for the future life of action. The sluggard becomes ashamed and is roused from his torpor—the indolent throws off his indifference—even the weaker in intellectual power feels that his capabilities will be improved, strength given to the mind, facility afforded to his manipulations—that there is a field open to him, and that pains-taking and laborious pertinacity, honest industrious hard work may find its reward, though not so high perhaps as that of lofty genius, but still an useful, honorable, remunerative position. The high prizes in all callings are only for the few. We see that in the church, in law, and in medicine. But there are nevertheless notable rewards for those, who fill up the intermediate grades of necessary usefulness in the great scheme of social life. These examinations are also useful, as affording the young man a true index of his powers and of his weakness. If he fail, he knows in what department he must work on to acquire the knowledge in which he is deficient. It is better that he should ascertain where his weakness lies thus early, than that he should be taught it by a disastrous failure in professional practice.

Thus the pupil with a purposeless and vague scheme of study in his mind, has been taught an useful lesson, and learns that positive well-grounded methodical knowledge is superior to dreamy idealities of an unstable mind. That the sooner he puts off his indolent habit of thought the better, and the earlier he begins to methodize his mode of study, and seek a higher standard of attainment, the sooner will he gather the fruit, and the *riper* that fruit will be. He will find, that it is of no use to defer setting to work—the result of this preliminary contest with his fellows will but foreshadow the results of after-life competition. If in the one he fails and amends not, in the other he will be sure to be as far behind, with consequences still more serious. Even in my own classes at University College, I can at once distinguish the hopeful student of future years. The earnest attention he bestows on the subject—the eagerness with which he takes into his mind every atom of useful information, and notes them down in his memoranda—the accuracy and care with which he keeps his note book, and the fullness and variety with which he enriches and illustrates the reports of the lectures, which I occasionally require of my class during the session; all these indications prove to me, that such and such will carry off the prizes and higher certificates of the academic year; and I feel assured that they will afterwards gain the great prizes of professional life.

And thus must it be in these competitive examinations established by this Institute. It is a generous emulation in which each seeks to rise higher than his fellows, not by striking down his rival, but by more practised and skilled attainment to reach an excelsior height.

The examination papers shew the progressive steps, from the earliest elements of knowledge up to the higher ranges of creative thought. In the execution of buildings the artizan possesses, as the basis of his knowledge, the plumb line to ascertain the perpendicular or vertical, and tube of water to decide the level line, and without which elementary data it would be hardly possible for the practical man to move one step. But it is upon these simple tools, resulting from the general law of gravitation, that is built up the theory of construction, which renders the Pyramids in their vast extent true to that great law of the universe, and which gives to the Parthenon its stability, and to the magic productions of the Middle Ages that equilibration of vaulting, which suspends masses in mid-air with the slightest aid of solid support. Science and laborious study can alone teach this, for the results are not fortuitous, but proceed from the deepest theories and the largest experience. The student, far from being discouraged, should be encouraged by the fact; for one step leads easily to another, and the energy which can rise up the first round, can as easily surmount the other rounds of the ladder of fame, and each succeeding one will be the easier conquered, and the greater pleasure experienced in the pursuit as success confirms hope and practise increases strength.

We trust therefore in January next, to see our young friends come forward to these examinations with as much zeal as at the last and in undiminished numbers. Then will the profession raise each year its standard of proficiency, and achieve new triumphs in the monuments which will be erected; until in taste and skill they will not only equal but excel the works of Greece and Rome and of the middle ages, which have hitherto borne the palm of unrivalled excellence.

I have to notice another point connected with the education of the young Architect, which is the short time in which Parents and Guardians imagine that a youth may be qualified to start on his professional career. I have been asked by some if three years would be too much; and I know cases where a four years' apprenticeship was considered a species of interminable bondage. There cannot be a doubt that to revive the term of former times, of seven years' clerkship in the office, would be a sacrifice of much precious time; but when we look at the papers of our competitive examinations, the term that may be usefully passed in the Builder's workshop and with the practical measurer, and the thorough routine of practice to be acquired in an Architect's office, we cannot doubt that six or even seven years may be usefully and agreeably spent by the youth, who desires to be an earnest, thorough, well grounded practitioner, and to enter upon the real battle of life armed at all points, and capable of undertaking any responsibility.

In speaking of the professional career I must venture to urge the importance of young men acquiring the business qualifications of practical life, as being essential to their satisfactorily realising all the fruits of the more intellectual departments of their pursuit. And I do not mean, to say that the most qualified are always and necessarily the most successful, or even when successful, carry off the crown without a thorn to remind them of the instability of all human enjoyments. There is so much of business mixed up with the artistic portion of our profession, that often does patronage or chance, and even the very incompetency of Committees or Patrons, or cunning, win the premium from the more deserving. The very tendency, as in the other Professions, to throw every thing, good or bad, great or little into the hands of a very few who may stand at the top of the tree, prevents that fair distribution of employment, which would foster rising talent and reward other meritorious members.—Again, the want of a distribution of Patronage by the Government in the many works they have to execute, prevents that fair encouragement to those, who after many years of wearisome toil may have carried off the highest prizes of our schools, and spent a little fortune in foreign travel, and then starting into practice find all their fair claims to notice disregarded, and themselves unheeded: as though they had no claims to distinction and deserved not the slightest token in recognition of their studies, their sacrifices, and their merits. In fact the Government very properly expect to employ men of the very highest talent, and yet make no effort, contribute nothing to place the means of instruction, improvement and subsequent encouragement within the reach of the earnest aspirant. But there is the like realization of bitterness even to those who have carried out the noblest works, and stand the objects of envy and admiration to the unthinking. Of such three striking instances occur to my own mind. The Committee for the Building of the International Exhibition of 1851 consisted, as you know, of six members—three Engineers and three Architects: of the six "quorum minima pars fui" I am the only survivor. To three of these, my colleagues, I allude,—Isambert Brunel, Robert Stephenson, and Sir Charles Barry; and all will allow that they were fit representatives of varied mental qualities in their several pursuits.

Brunel—brilliant, quick, full of resources, impassioned. Stephenson—solid, thoughtful, calm, and deliberative. Barry—profoundly acquainted with his art, master of various styles, a sound thinker, and rich in imagination. All of them at the top of their profession, and having had to execute critical works of the highest class.

When the first section of the Great Western Railway was open to Slough, the success of the continuous bearing system of sleepers seemed a triumph of Brunel's sagacity. He had accomplished a great reform and established a new theory, and one might have imagined that the moment, when he received the congratulations of a numerous assembly of scientific men, would have been the happiest, proudest of his life. But I recall well the words as they fell from his lips, when with somewhat of a depressed tone he acknowledged the compliment paid him and said, "however fair all might seem and however prosperous the experiment that day had proved, there still remained much of care and anxiety and responsibility and doubt, ere he could realize to himself that he had indeed succeeded."

When the last tube of the Menai Bridge was to be raised, Stephenson invited his colleagues down to witness the operation. Barry and myself alone could avail ourselves of the opportunity, and we saw the marvellous combination of simple expedients, by which the huge mass was floated down to its position between the piers, and the rapidity with which the enormous weight was raised some tens of feet, and without the slightest pause, or irregularity, or disorder lodged in its permanent resting place. On this occasion we heard him declare in reply to the felicitations of a large company, that not all the triumph, which attended this great work, and the new solution of the difficult problem of a rigid roadway at such a height, and carried across such a stream so as to allow the largest vessel to pass with all its sails set beneath it, could repay the anxieties he had gone through, the friendships compromised and the unworthy motives attributed. And were another work of like magnitude offered to him with such consequences, he would not for worlds undertake it!

We all know how our sympathies were excited by the ordeal of twenty years, through which Sir Charles Barry had to pass for the completion of the Houses of Parliament. At the first an unworthy attack from certain competitors—Committees of the Commons—Committees of the Lords—A succession of Chief Commissioners not always favorable—An extravagant system of warming and ventilating thrust upon him at a cost of £80,000. to the nation—and even the creation of his own prolific genius attributed to another eminent in the art, but who was too generous to allow such a misstatement without the directest denial—and then again the parsimony of the Treasury abstracting from the man of genius his fair professional reward. All these harassed and embittered the life of our friend, and deprived him of the unclouded joy he ought to have felt in having executed the most important building of modern times, and in having endowed the metropolis with one of its noblest features.

Such may be lessons to every one, and I recall them not to depress, but to strengthen all under the greatest difficulties; and to shew that, whatever the struggles they may encounter, whatever unjust aspersion they may have to endure, it is but the common fate of genius and success; and that after all the only best reward is the consciousness of having done one's duty, and not the smiles or favors of a fickle admiration. So true is the wise observation of Guizot at the conclusion of his Life of Washington: "That success even does not efface the sad impressions, to which the combat of active life gives rise; and the fatigue contracted in this arena is prolonged even in the calm retirement of repose."

Passing to the subject of the nature and quality of our professional publications, I think it must be acknowledged that the architectural illustrated works of late years, with the exception of Mr. Cockerell's last volume and some other works, have not maintained the high standard, which was generally prevalent some years ago.—Where it is the intention of the author to publish transcripts of his own sketches, and not seriously and elaborately worked out drawings, lithography is undoubtedly the best imitation of the crisp, sparkling and off hand pencilling of the artist. But wherever the graver is used, it should be with the delicacy, refinement and finish, which distinguish Stuart's Athens, the volumes of the Dilletanti Society, or the works of Britton, Pugin, Blore, and such standard authorities. The loose, scratchy and guess-work execution of some productions do not worthily represent the art. The French, on the contrary, and the Germans execute their engravings more elaborately and carefully, and with a higher finish. At this time there are two works publishing by Mons. Daly at Paris, and there is one in London, professing to give practical examples of constructive architecture, and they allow of a comparison on this subject. The English work is a compilation of examples without selection. Details are given of cornices, mouldings and other details, possessing no special beauty or grace, and taken apparently from the ordinary volume of Gibbs of the last century. They are drawn to an enormous scale, as though the editor did not care to take the trouble to reduce them to a manageable size, and many of them repulsive from their vulgarity. There may be an excess in point of scale, and parts drawn to the size of execution often unnecessarily encumber such a work, and render it ponderous. In fact, the reader had better be referred at once to the original work from which they have been copied. Great discrimination is required in works of this class, certain elements of selection should be observed, a degree of merit in point of taste and of talent as to the construction. There is no doubt that, in mere matters of execution, there may be many instances of most ingenious skill by practical mechanics, engineers and others, who lay no claim to taste, and whose previous education may not have qualified them to invent combinations of form and detail, so as to invest construction with the nobility of artistic grace. In instances such as these an editor of such a work would be wise to confine himself to the mere portions embodying the true value of the example, the scientific disposition and combination of the parts. But to give what is *intended* for mere ornament, but which is in truth mere disfigurement and caricature, is to be unjust to the designer and lay bare his weak point. Although the price of such a publication to be generally purchaseable should be placed at the lowest remunerative figure, yet the execution ought never to be coarse and negligent; nor should there be neglect either in the selection or arrangement of the details. Nor ought it to be a reproach that many of the finest and most interesting and instructive works of recent time are absent; as though mediocre practitioners, anxious to make their names known, may have been but too happy to volunteer illustrations; and the editor no less ready to accept the costless sheets, which might swell his work at little expense.

Mons. Daly's publications offer a striking contrast to the preceding, though they have somewhat of a like object. The illustrations of the Revue d'Architecture are drawn and engraved with the utmost refinement and finish, and shew an earnest loving treatment of the subjects. And I must notice with emphasis the graceful and elegant manner in which he has got up the Architecture Privée, or Domestic Architecture of the Nineteenth Century, under Napoleon III., being new houses of Paris and the suburbs, consisting of plans, elevations and sections, and details of doors, windows, staircases, painted decorations, chimneys, gardens, &c., the plates all executed on steel. The selection is made with peculiar care, and I feel that those, who are refined in taste, will always require in such illustrations the chaste rendering of such a work as this, which can alone worthily illustrate whatever there may be of graceful design in the original, and which a coarse execution will only debase and disfigure. We might wish less repetition in the examples of the same sentiment, taste and distribution, and which becomes to a degree irksome, and we may desire more practical details as to the structural combinations: but in point of execution these volumes are fine instances of care and finish, and offer a standard, to which it would be desirable for us not to be inferior. We were the first in our Stuart's Athens to give the highest tone of illustration for architectural works, which the French have been eager to equal and surpass.

You will recollect with what careful deliberation the Institute drew up a scale of charges for professional services. It was anticipated that this would prove an useful guide, producing uniformity of practice on this delicate and important point. And, at the same time that it justified the Architect in his fair claims, it should prevent an exaggerated charge for remuneration discreditable to the general body of the profession, and happily many cases have occurred in which such questions have been settled to the satisfaction of parties by mere reference to this scale, and legal intervention and misunderstandings avoided. But I am sorry to say, that instances have arisen in my own experience with regard to some practitioners, not members of our body and imperfectly acquainted with its scope and tendency, in which this scale of the Institute has been quoted to support unreasonable demands, and although worded with every care to avoid misinterpretation, it has been adduced to justify claims greater than intended or justifiable. It is to be remembered by us, that this scale was meant not merely for the protection of the employed, but also for the protection of the employer; and that any attempt to contravene that great principle, and to render it a pretext for an excessive recompense will be contrary to the spirit of integrity and high honor, which should distinguish such a body as ours. Wherever called upon to give an opinion as to its intent and bearing, any doubt which may arise, should be interpreted in the most liberal manner for the Employer, since it was our Body which drew up the scheme. Upon no other ground will this scale of charges be entitled to be considered as fair and impartial, or referred to as equitable, authoritative and conclusive upon such questions.

It is subject for satisfaction to notice, that the Metropolitan Board have with most creditable despatch, recently accepted a tender to the amount of more than half-a-million, for the execution of the portion of the Thames Embankment on the north side from Westminster to Waterloo bridge, and that particulars are preparing for the section from the Temple to Blackfriars. It is to be assumed that the like movement may take place in regard to the South side, and that thus our noble river may have its banks faced with a continuous line of quays, which will at the same time sweep away the mud deposits that poison the water and the air, and will give it that aspect of majesty suited to the metropolis of a great Empire. It is gratifying to observe that the leading features of these quays will display a certain artistic treatment and will not be like the railway bridges, which span the Thames in the same locality, hideous masses of utilitarian skill. We congratulate also the public in London and Dublin upon their being roused to the consideration of the frightful erections contemplated by railway companies, and of some which even now deform certain of our principal thoroughfares and threaten others. There has been too much indifference hitherto to the important influence of architectural taste on the convenience and enjoyment of the public. If proposed works embodied an useful purpose, the consideration of their forming decorative objects was regarded as non-essential; and we have thus certainly allowed many disgraceful disfigurements in the metropolis. In France it is the reverse. As in Athens, the rude speaker however eloquent, who sinned in his grammar or his quantities, was hooted down, so in Paris public improvements are not tolerated unless treated as public embellishments. The consequence is, that Paris under the spirited and enlightened renovations of Napoleon III, seconded by the æsthetic tendencies of the public mind, has become the queen of European capitals. She leaves all others at an immeasurable distance by the noble disposition of the new thoroughfares, the amplitude of the streets and public areas, the nobility of the public edifices, and the tasteful decoration of the private dwellings. It has become the fitting and enjoyable residence of a highly-refined intelligent people, whose life is not wholely absorbed in the cares of business or the mere mania of amassing wealth.

Much of this conduct of ours arises, in part from the unwillingness of the Government authorities to incur responsibility, still more from the niggardly parsimony of Parliament to afford the requisite funds. Only the other day the Chief Commissioner was precluded from entertaining the proposal to make the newly-proposed and leading street from Blackfriars to the Mansion House, 80 ft. wide, instead of 70 ft., because he felt assured that Parliament would refuse the extra amount (some £100,000.) And this in the face of the increasing traffic in the City, and the inadequate width of any of its largest thoroughfares. My feeling is, that it would be wise in Parliament, as being of the highest benefit to the Empire, if public subventions, as in France, were given in order to promote a spirit of reformation in our towns. There are many which, by the tide of manufactures and commerce, have from insignificant villages become emporiums of trade, and, however extended in all directions, have retained the original narrow high street and the ways and alleys opening thereunto, so as to maintain and paralyse additions into the like stinted dimensions. They thus still present cramped tortuous lines of communication without one grand avenue from north to south or from east to west, to open up the way for the teeming tides of living beings, who swarm the streets, hustling and impeding each other, or for the carriages, waggons, carts and animals huddled into one mass of dead lock. If such contributions were once freely accorded in a certain proportion to any municipality, who would undertake the task and provide the main funds, we should soon find the spirit of improvement arise, petty local jealousies put to flight, higher aims entertained, and hopelessness of improvement superseded by energetic efforts to ameliorate and correct, and to accomplish grand and useful projects. Oh! for a ten years of the liberal and tasteful spirit for improvement, which now pervades the whole of France, and England would accomplish great things.

There is also required some immediate interference by Parliament for the purpose of securing to the labouring classes more fitting dwellings, than those swept away to make room for the metropolitan railways. There is wanting a greater consciousness of parental care in the authorities, whether the Parliament or the Government, to grapple with this difficult question. It is hedged in with difficulties; it is no one's special business; it carries with it no profit, and would have only the thankless reward which usually attends philanthropy. But it is a duty—the health, the happiness or misery of tens of thousands is involved in it; and it is a crime that, as a principle of action no longer to be deferred, the proper housing of the working classes lies in abeyance, and Parliament is heedless of the sufferings of the poor and of their duty to undertake the remedy.

Mr. Hansard informs me that the Artificial Stone Committee, appointed in March last, have held eight Meetings and investigated several processes, and tested by crushing at different dates after their manufacture each series of samples. These proofs necessarily take considerable time at each Meeting, and extend over many weeks; this has prevented the Committee from being ready with their Report at this the commencement of the Session. They think it likewise advisable, before arrriving at any conclusion, to submit several of the samples to the exposure of the weather during the winter season, and to note the effect, if any, of frost after wet, or sudden change of temperature upon them. During their investigation the Committee have taken the opportunity to test the strength of other materials, viz:—Bricks, cements, slate, stones, marble, and woods, the comparative results of which, they hope when finished, will prove interesting to the Institute. Some startling questions present themselves on this topic:—How is it that all at once we find out, that none of our natural stones in common use are fit for construction, but liable to rapid decay? How is it that it should be assumed to be more economical to go through the process of manufacture, and to transport the object to the work at a less cost than the natural stone itself? Why is it that the best beds of Bath, the most enduring of Portland, such as Sir Christopher Wren used at St. Paul's, cannot be extracted from the quarry and conveyed to London at less expense than the artificial product? Are we prepared to put up with the dingy opaque and unartistic effect of the artificial stone, when the varied tints and the transparent tones give so great a charm to the natural material in buildings? Are we sure of their permanence?

You are aware, Gentlemen, that a considerable body of admirers of the late Mr. A. K. Welby Pugin, anxious to mark their respect for his memory, and for the eminent services he had rendered in the revival and just appreciation of Mediæval art, entered into a subscription and raised a sum amounting to about £1000. After much deliberation and the due consideration of a variety of proposals, as to the best manner of carrying out this intention, it has been at length decided to realise a wish, expressed many years ago by Mr. W. Pugin, to found an endowment out of the annual dividends or proceeds arising from this principal sum, and to apply them yearly to assist a well qualified student to travel for not less than eight weeks in the United Kingdom of England and Ireland, for the purpose of studying Mediæval architecture in Great Britain, whether in ancient or modern buildings: no person, who has once held the studentship being eligible for re-election. In the first year the election is proposed to be made by four certain members of the Committee of Subscribers and five Fellows of the Institute. In subsequent years it will be by a Committee of nine Fellows of the Institute to be named by the Council. A declaration of trust is proposed to be made, placing the control of the said fund under certain regulations in the Council of the Institute for ever. A draft declaration of trust has been prepared by the Committee of Subscribers and submitted to the Council, and will soon be brought before the Members for their consideration and adoption.

Since the closing meeting in June, the concluding part of the volume of Sessional Papers, termed the Transactions of the Institute for the year 1862-3, has been issued. I feel assured that the Members must be satisfied with the series of papers, both on account of the importance, variety, and treatment of the subjects, and the discussions to which they gave rise, and the illustrations which accompany them. It would be difficult to quote the publication of any scientific body with which this may not be favorably compared,—the names of the authors, and the useful nature of the information contributed, are alike favorable to the Institute, whether treating on matters of taste, discussing questions of science, or describing the buildings and monuments of ancient or modern times, the abstruse topics of archæological research, or the practical ones of structural appliances,—they have been carefully brought before the Institute, and as thoughtfully considered by the Members.

It will be our duty to contribute such papers for the Session, which opens on this Evening, as shall maintain the high standard of the last. There can be no excuse for any member, however immersed he may be in the duties of his profession, to neglect the claim which the Institute has on his active co-operation. When we see such men in high position as Lord Derby addressing the Collegiate body of Liverpool in an elaborate and eloquent speech on education; when we see the Bishop of Oxford, charged with the care of all the Churches of his Diocese, distributing in Brighton the prizes to the successful competitors in the Oxford examination, and closing the proceedings with an address, replete with wisdom, brilliant in thoughts and language; when we see a Secretary of State and a Chancellor of the Exchequer producing elaborate works and making masterly speeches on general topics of art and science, even amidst the overwhelming duties of their arduous political life, is it too much, you will surely pardon me if I ask, to expect of our Members their contributions to the papers, which shall give interest to our meetings and add to the stock of our every-day experiences! I pray you therefore, Gentlemen, to give your names to the Secretaries as soon as possible, and the titles of the subjects you propose to consider.

Another circumstance for me to record, connected rather, perhaps, with the social than the scientific occurrences of our body, has been a banquet at Greenwich in August last, to which Mr. Tite, our late President, was invited. Its object was to mark the success with which he had discharged his duties in the chair, and the advantages derived by the Institute from his Presidency. The Lord Mayor, the Chairman of the Metropolitan Board, and other eminent public men were present on the occasion to do honor to one, who has entitled himself in his public capacity to the esteem and respect of his colleagues. Whether in this room or in the senate—whether in public or in private—Mr. Tite has ever promoted the interests of our body, and conferred on it substantial favors. His name is intimately associated with the position we hold in the face of the country; and to his advocacy in Parliament we are indebted, that the Houses of Lords and Commons have recognised our status, and confided to us duties and functions, which it must be ever our pride faithfully to discharge.

On considering the varied operations of the Institute, to which I have ventured to direct your attention, it is fitting to call to mind that all these could not have been realised, without a great sacrifice of time, attention, thought, and devotion by those, who have had more immediately the charge of the official duties and business of the Institute, I mean our Honorary Secretaries. To their untiring zeal, to their intelligence and business habits, we owe much of the active vitality of our body; and to the courtesy with which they transact our affairs, the goodwill and respect with which the Institute is treated on all sides. To Mr. Hayward we are indebted for the perfect arrangements connected with the last rites paid to our late friend Professor Cockerell, and which elicited unequivocal approval. To Mr. Seddon, with Mr. Hayward and Mr. Nelson, we owe all the success of our other proceedings, and it is well we should remember that these arduous duties are not the mere pleasurable occupations of an idle life of men of leisure, but precious moments, hours and days stolen from absorbing professional avocations. They are sacrifices of self to the public good of the Institute and its Members. For they have to conduct all our proceedings, provide papers for our meetings, carefully husband our finances, revise and publish our transactions, cherish in us a spirit of interest and devotion to the Institute, conciliate our co-operation in their efforts, maintain our correspondence with our Foreign Brethren, and keep us all in good humour from the President down to the youngest Student. It is for such services, I am sure you will concur with me, that our heartiest acknowledgments are due to those gentlemen.

In conclusion, Gentlemen, I would observe, that all Art is a magic power. It is beyond the ken of human cunning. It is an instinct—an innate principle of fervid imagination: be its workings slow, laborious, like those of a Rousseau or a Byron, or glowing and ready like those of a Michaelangelo or a Vanbrugh, still it is the same divine gift; with some it is on the very surface, with others deeper seated, and only to be realized by immense toil. However powerful Poetry, Music, Painting, or Sculpture may be, as arresting the attention, fascinating one's faculties of thought or reason, speaking with a thrill to every emotion, pleasing, teaching, ennobling, yet Architecture by other means and by instruments the most rude, is at once more necessary to man, and still more absorbs his feelings and his admiration. Out of the crudest materials and mis-shapen masses she creates pile upon pile—gives them a grace not their own—combines them with a skill at which the most scientific are lost in wonder. Her monuments, under the accumulations of centuries or overgrown with creepers and lichens, employ the learned to explore their origin and destination. In them they discover unthought of secrets of past times—graces in their proportions, beauty in their ornaments, and hidden art in their paintings. They may reveal a nation *long since forgotten or before known only by name.* Architecture enriches the desert, as at Palmyra, with vistas of continuous colonnades and splendid palaces, and offers a halting place of safety to the weary traveller, security to the wealth of commerce. On the bare rock she raises piles of vast magnificence and fanes of matchless beauty, in whose very fractured stones successive races seek for a hidden law of beauty, an inspiration to enable them to revive the truest aim of art—nature's most exquisite transcript. Who is there, that wanders among the stately ruins of the Athenian Acropolis or the sublime memorials of the Roman Forum, and does not envy the glory of those past ages of classic art? Who can contemplate those traditions and mysterious sublimities of the creation of the middle ages, and does not feel his heart throb with powerful emotion? Who does not dwell with delight upon the works of that race of Merchant Princes, who upon the shifting sands of the water-covered lagunes could rear up those stately piles, which bear the names of the Grimani, Balbi, Vendramini, Foscari, and bid wood, stone, brick and marble speak with stirring effect to those, who have eyes to see and taste to appreciate: men who with fierce republican pride might have challenged cardinals, princes, popes, and kings and emperors to produce nobler realities out of fiction? The Architect it is, who with his pencil and compass, with a mind full of deep things, under God's providence and with his brave heart, creates all this and toils on unheeded, often misunderstood, frequently blamed, rarely encouraged except by his own bright star of hope and faith. Let us then work on with the consciousness of something within us, which may sooner or later, before or when in the grave, be at length understood, admired, honored by our fellow man.

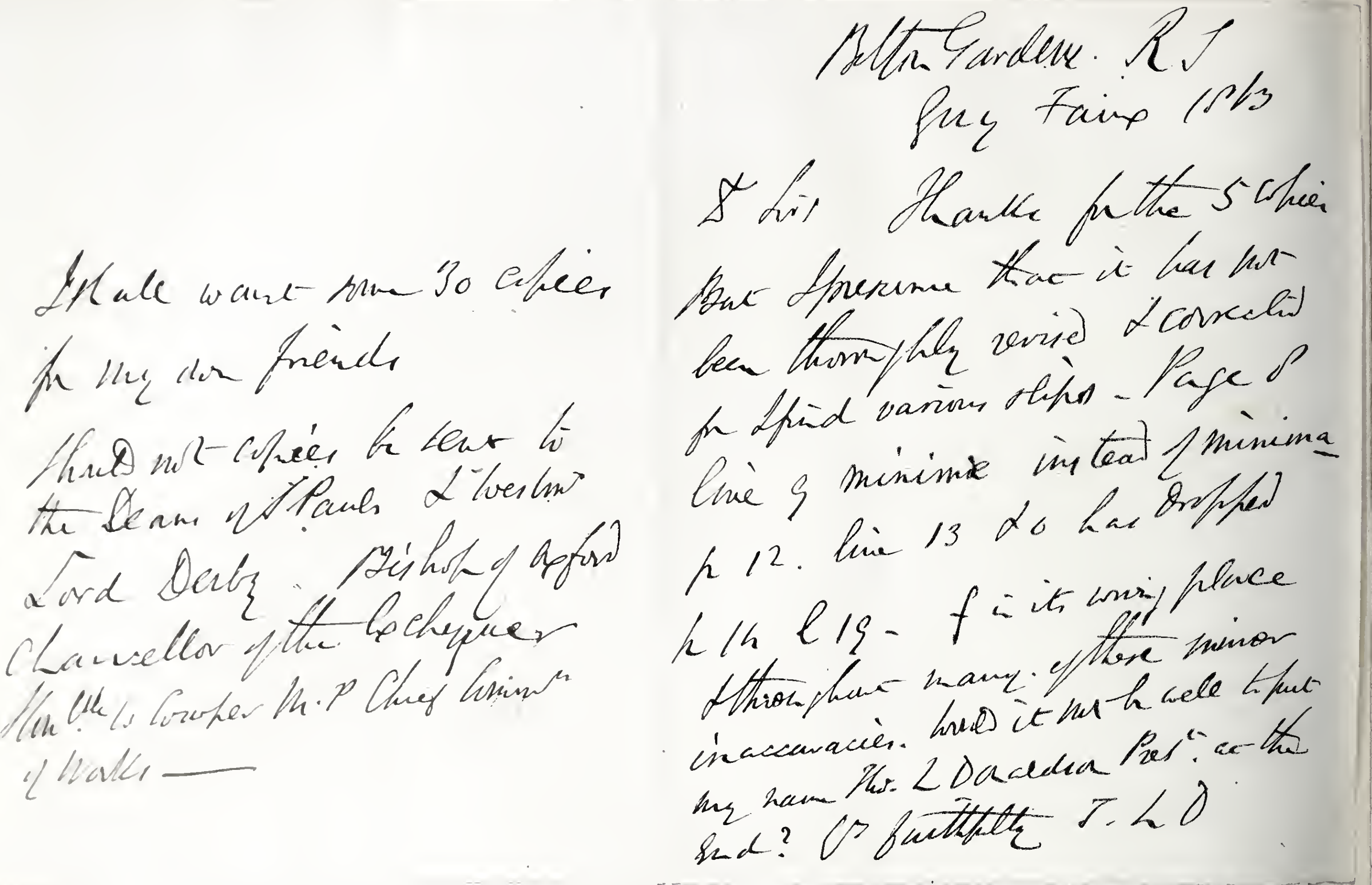
THOS. L. DONALDSON, President.

Mr. George Gilbert Scott, Fellow, said before the business of the evening was formally closed the least they could do was to express their thanks to the President for the very eloquent, spirit-stirring and encouraging address which he had given them this evening, and was glad to think that the same would be published and circulated amongst the members in the Transactions. He would not attempt to follow the President in the different subjects he had adverted to, nor to dilute with his poor words the eloquence and perspicuity with which he had enumerated the many subjects which called for their attention at the commencement of this session. He would select, however, one subject which he thought was a peculiarly practical one, viz. the remarks of the President on the absolute dearth of Architectural Education in this country. It was true the system of practical education of the young architect followed in this country was on the whole the most healthful one, viz. the system of learning their profession by working with their masters. So far as that went they were in the right road; but they nevertheless knew that what was learnt in an architect's office was not the *high art* of his profession. He learnt the routine of business, the technical working out of the designs of his master, and a great many other things which it was necessary for him to know; and he learnt them better than could be done in any other way; but the *high art* of his profession he could only pick up accidentally, and in a very minor degree, in his master's office; and if he wanted to improve himself beyond what he learnt there, he could only do so by chance opportunities, which he had to look out for on his own account. He believed it to be the duty of this Institute to take this subject into its most serious consideration. He believed it was being taken into consideration by the junior society,—the Architectural Association: but besides these and all the other Architectural Societies, there was one Institution in particular whose duty it was to offer to the Students of Architecture instruction in those connecting links which united Architecture with the two sister Arts: He referred to the *Royal Academy.*

Hitherto, he believed, it had been impossible for the Royal Academy to do it. They had never had above half space enough, and little more than half the year, in which they could offer instruction to their students, and therefore he believed it had been with difficulty they had been able to carry on in any degree satisfactorily the schools even of painting and sculpture. He believed they would be desirous to remedy that defect, if space (as they now hoped would be the case) were given. But his particular reason for adverting to this subject on the present occasion was—not to proclaim the deficiencies of a great Institution to which he had the honor to belong, but to call attention to this remarkable fact: that though no inconsistency could be more manifest, than that a Society formed to promote the three sister arts of Painting, Sculpture and Architecture, and which invites students in all these arts, should refuse all instruction to the students of one of them; though nothing could be more manifest than the absurdity of having schools for *two* of those arts and none for the third;—yet, in the face of all this, a commission of seven noblemen and gentlemen of the highest position in the country had been sitting for months enquiring into the deficiencies of the Royal Academy; they had received the evidence of witnesses of all classes, many of whom pointed out this manifest defect; and—in the face of all this—so little was their appreciation of our own branch of art, that they had made an elaborate report without giving to this subject *one single word of notice* or allusion!!! He called attention to this as a proof of the degree of consideration which architecture received in this country, at the hands of those from whom it had a right to expect the very highest appreciation.

Mr. DIGBY WYATT cordially seconded the proposition of a vote of thanks to the President for his address, particularly because to the stimulus of his eloquent exhortations, the respected President had added, and was continually adding, the yet more powerful one of his example. When they saw one with so many demands upon his time and energies giving so much thought to the subjects which most affected their professional interests, and watching with almost parental solicitude over the good progress of the art it was their privilege to practice, it gave a lesson, and set a model alike to young and old, worthy of all imitation, and one which he hoped would not be lost upon either.

THE PRESIDENT in acknowledging the compliment said his few words had fallen short of what he wished to submit as worthy of the occasion, but he was much obliged to them for the kind way in which they had received his remarks.

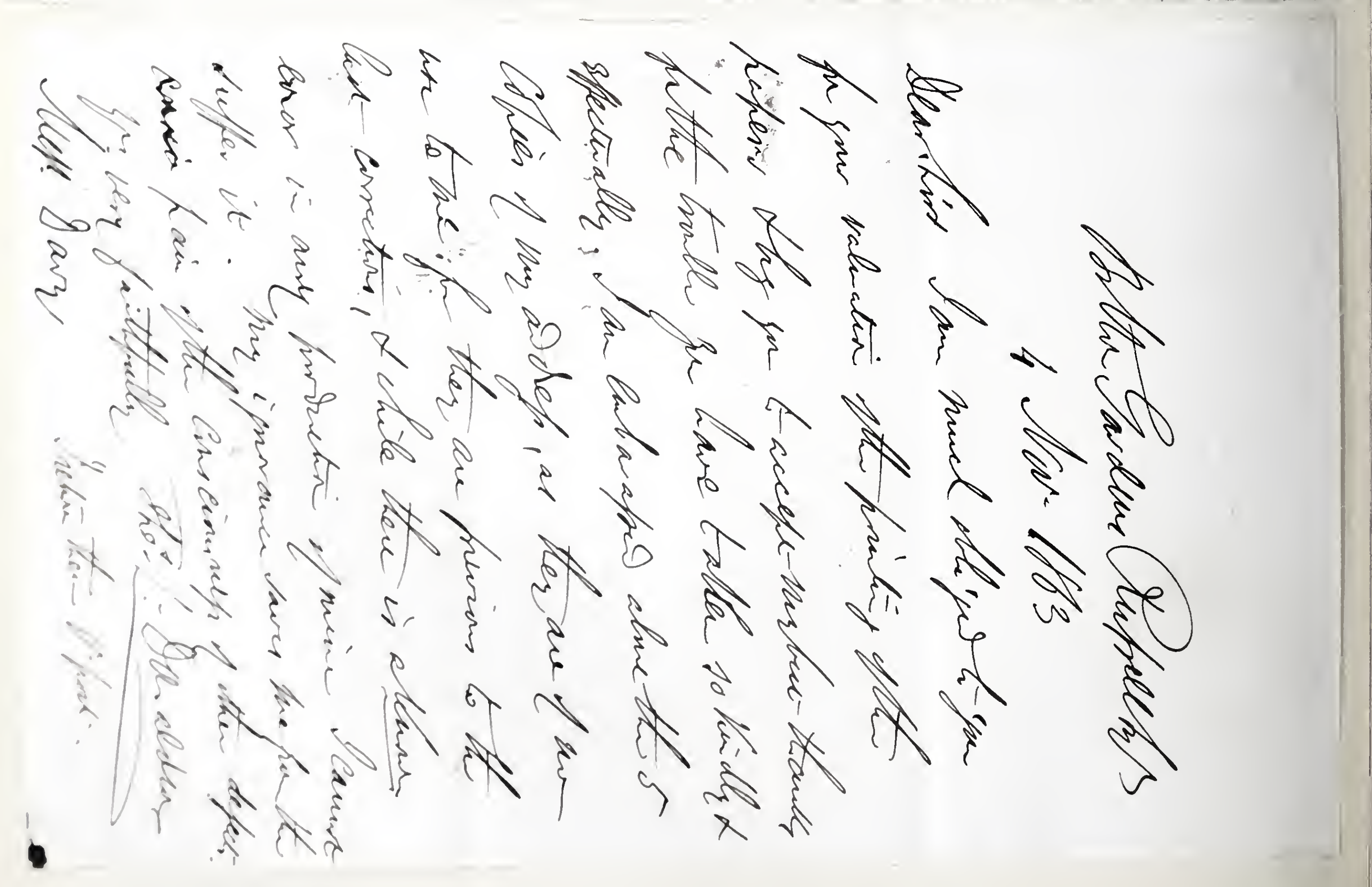


Bolton Gardens. R.S.
Guy Faux 1863

Dr Sir Thanks for the 5 copies But I presume that it has not been thoroughly revised & corrected for I find various slips — Page 8 line 9 minimæ instead of minima p 12. line 13 &c has dropped p 14 l 19 — f in its wrong place & throughout many of these minor inaccuracies. Would it not be well to put my name Thos. L Donaldson Prest. at the end? Yrs faithfully T. L. D

I shall want some 30 copies for my own friends

Should not copies be sent to the Dean of St Pauls & Westmr Lord Derby. Bishop of Oxford Chancellor of the Exchequer Hon. Wm. Cowper M.P Chief Commr of Works —



Bolton Gardens Russell Sq
4 Nov. 1863

Dear Sirs I am much obliged to you for your valuation of the printing of the papers & beg you to accept my best thanks for the trouble you have taken so kindly & effectually; I am embarrassed about the 5 copies of my address, as they are of no use to me; for they are previous to the last corrections, & while there is a known error in any production of mine I cannot suffer it. My ignorance saves me from the [illegible] pain of the consciousness of other defects.

Yrs very faithfully Thos. L. Donaldson

Messrs Davy

I return them by post.

SOME ACCOUNT OF THE PROFESSIONAL LIFE AND CHARACTER OF THE LATE PROFESSOR C. R. COCKERELL, R.A., FELLOW, AND LATE PRESIDENT R.I.B.A.

By SYDNEY SMIRKE, R.A., Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, November 16, 1863.

I have been much flattered by an invitation to address to you a Memoir of our departed colleague. I accept that invitation with pleasure, for I could hardly apply myself to a more grateful subject; yet I enter upon it with many misgivings. I greatly doubt my power to do justice to the subject. The mere outlines of the leading facts of his life I have, of course, abundant means of drawing, but to fill up those outlines adequately and justly needs an abler pencil than mine. Perhaps some future biographer of adequate powers may be induced to fulfil this task. In the mean time, I feel that I should be wanting in my duty to the Institute were I to shrink from the attempt, at least, to sketch the more striking lineaments of his character, to point your attention to his more important works, and generally to convey to you, and to those who may follow us, some idea of the career of this artist, who was so great an ornament and honor to our profession. Biography appears to me to be one of the most agreeable, as well as one of the most profitable exercises of the mind. It is *agreeable* to trace the progress of talent and character from their earliest germination to their full development; to mark the genial effects of early cultivation, and the refining effects of experience and observation; whilst it is *profitable*, inasmuch as this study of a man's career furnishes us with an excellent practical guide for our own course, and for the course of those whose future we may wish to influence or direct. To undertake a biographical sketch, therefore, is, I am pleased to think, a really good work, and I enter upon it, although fully conscious, as I have already admitted, of all my inability, yet with a hearty and earnest desire to do my best.

Charles Robert was the second son of Samuel Pepys Cockerell, himself an eminent member, also, of our profession, whose practice was general, but whom circumstances chanced to lead especially to engage himself as Surveyor in the management of various important building estates. He was a gentleman of great judgment and probity, and his professional course was most successful. Charles Robert was born in London, in 1788. His earliest education was received at a private school, from which, at the age of fourteen, he was removed to Westminster School, where he remained until he was between sixteen and seventeen years of age, when he entered his father's office in order to lay the foundation of professional knowledge. Here he remained for four or five years, during which time his diligence enabled him to become an accomplished draftsman. The elder Mr. Cockerell and my father had been long on friendly terms, and it was natural that young Cockerell should be early introduced to my brother, Sir Robert, at that time rising into eminence in his profession. In A.D. 1809, the task of erecting a new Covent Garden Theatre devolved on him, and young Cockerell, then about twenty-one years of age, feeling great interest in the work, assisted and zealously laboured with him throughout the progress of it. It was certainly an arduous work: in the present age of great contractors and slovenly workmanship, we can hardly appreciate the extreme difficulty that must then have been experienced in getting this enormous and most solid work completed in ten months.

It was in May, 1810, that Robert Cockerell commenced a long course of professional study on the Continent—a course attended with very brilliant results. His accomplished mind, and lively, agreeable manners, soon brought him many friends, but he had the good sense to seek out especially the friendship of ardent fellow-labourers of congenial tastes and pursuits, such as Baron Haller, Stackelberg, Linkh, and Chev. Brönstedt, men whose names have since become familiar to all engaged in the cultivation of classic art. I will not here enumerate his archæological labors: to these I shall shortly advert. For about eight years Robert Cockerell was absent from England, during which time he twice thoroughly explored Greece—both on the Continent and among the Islands—so glorious in the History of Philosophy and Art. For the greater part of the year 1812, he was engaged on the remains of ancient Sicilian architecture, and three years he gave to Italy. He returned home, in 1817, to receive the applause and congratulations of many friends; and it was then he entered on the path of real professional life. Such are the brief outlines of Mr. Cockerell's earlier career—a career which has been prolonged, not, indeed, to the length which his sorrowing friends would have desired, yet long enough to enable him to establish for himself a permanent position among the worthies of our profession.

I will proceed now to enumerate some of the more material works upon which his talents were bestowed. It may be, probably, that his highest distinction—that which has established for him an European reputation—was due to his Archæological labors, but it behoves us first to regard him simply in the character of an architect. You will have observed that his antiquarian researches occupied a considerable portion of his most valuable earlier life—a more considerable portion, perhaps, than would have been expedient, had it been the sole mission of his professional life to erect buildings. For some years after his return to England, it was a labor of love which occupied his chief attention, to digest and work out the results of his antiquarian researches. Still his fine taste soon procured for him professional employment. Among his earlier works may be named the Literary and Philosophical Institution, in Bristol—a view of which he exhibited at the Royal Academy in 1821. This work was rendered difficult, both æsthetically and practically, by the extreme declivity of Park Street, in which it was erected. The design is plain, for the available building funds were very moderate, but it is marked by that delicacy and purity of detail which have characterised all his works. Shortly after this he was employed by the late Marquis of Lansdowne, in adding to the mansion at Bowood, and by other patrons of art. The formation of the new street leading from Portland Place to Pall Mall, about this time, afforded a great opportunity for architectural display, which was scarcely so productive of meritorious examples of street architecture as it ought to have been. But it contains one or two good works, one of which was Mr. Cockerell's, namely, Hanover Chapel, in the parish of St. George's. This work attracted much attention at the time, from its originality of design, and Mr. Cockerell paid the utmost attention to all the minutest details. The feeling did not then exist which regards Gothic as the only style suitable to Ecclesiastical architecture, and Hanover Chapel found, at that period, many more admirers than it would find now. Fashion is proverbially changeful, whether in the builder's work or in that of the mantua maker. Although the changes may not, in both cases, follow each other in equally rapid succession, yet the law of change is universal. The most despotic arbiter of taste cannot stay the fluctuations of fashion. When Mr. Cockerell was entering the world of art, there was a perfect furor for Greek art, and young ladies, intent on needlework, would endeavour to catch inspiration from his sketch books. That taste waned, and inspiration was then to be sought among the picturesque remains of French renaissance: buildings were looked at with admiring favor which had before been regarded as grotesque and barbarous, and old books were sought for, with eager curiosity, which had been previously valued as waste paper. I believe our noble first President contributed largely, by his example to promote this last-mentioned, short-lived, taste: but it was soon to be eclipsed by the rising glory of Gothic art—a glory which will, probably, retain its hold on public favor for some years to come.

Mr. Cockerell's pencil took a higher flight when he designed the National Monument in Edinburgh—a noble Walhalla which will never be completed. The same fate attended the Cambridge University

Library, of which one wing only has ever been completed. In 1832 the building so familiar to most of us, in the Strand, was erected by him, for the Westminster Insurance Company. His appointment as surveyor to the Bank of England, opened out to him a wider field than he had yet enjoyed, for practically realising his æsthetic views. The Dividend Office was one of his most pleasing compositions, although in obedience to the law of change, to which I have adverted, the whole has been since utterly obliterated. The Taylor and Randolph building at Oxford must now be named, bearing date about 1841. Although open perhaps to some criticism, this building has high claims to our attention. It is unquestionably a work of great elegance, and of especial beauty in its details. Like others of Mr. Cockerell's designs, it is marked by the peculiarity that the principal order is surmounted by an upper story, not a superimposed order, nor yet an attic, but yet of so considerable a height as to impair, in some degree, the value of the order below. On this upper story is a cornice of large dimensions, Mr. Cockerell, no doubt, feeling that a cornice is the natural crowning feature of any building; thus there are two parallel cornices rivalling each other in importance, and producing an effect on which some difference of opinion may be expected. This building is, nevertheless, an honorable monument of its author's graceful style, and of his extreme carefulness of detail; every portion of it, internally and externally, having evidently been very elaborately studied. If there is a class of critics who seek to depreciate this building, by calling it a " Pagan" one, it may be replied that the same designation applies equally to the Elgin Marbles, as well as to the compositions of Horace, Virgil, and the tragic poets of antiquity.

The London and Westminster Fire Office, and the Sun Fire Office, are both familiar to every resident in London: the former is especially original in its treatment, and well deserves study, for it is very certain that careful study was bestowed upon it by its accomplished author. I should, however, observe, that this work was the joint production of Mr. Cockerell and of our late distinguished President.

I should have stated earlier that so far back as the year 1819 he was appointed Surveyor to St. Paul's Cathedral. This honorable post he held during the greater part of his professional life, and the intimate knowledge which he thus of course obtained of that wonderful building and the habit he had acquired of studying it both in its conception and construction, had engendered in his mind the profoundest reverence for its great architect.

On the death of Mr. Basevi, in 1845, the Fitzwilliam Museum, at Cambridge, was placed in Mr. Cockerell's hands for completion, and much of the interior finishings of that building are from his design. I have already named the University Library in the same town. That work was the cause of great disquiet to him, for it was not without years of tedious and anxious competition, and endless literary litigation, that he obtained this important commission. The death of Mr. Elmes, in 1851, led to Mr. Cockerell's appointment to complete St. George's Hall, in Liverpool. The exterior of this very noble building was mainly completed at that period, but the interior finishings were the work of Mr. Cockerell, and anxiously occupied him during four or five years. Every one who has seen the interior of that fine Hall will have come away charmed with its artistic elegance; and if there is any portion of the exterior accessories with which he is dissatisfied, it is due to the memory of our friend to record that those exterior accessories are a monument of the unmitigated evil of lay interference. I need scarcely remind you, of what is so generally known, that the sculpture in the tympanum of this building, which was ably executed by Mr. Nichol, was designed by Mr. Cockerell, and is one among many evidences of his refined knowledge of design in the sister art.*

I have now told you of his earlier career, and have named, as briefly as I could, some of the most conspicuous works on which his long and laborious life was engaged. It is needless, perhaps, that I should enter into details of less moment. It remains, however, for me to enumerate the various honors which have attended his course. In 1829 he was elected an Associate of the Royal Academy; in 1833 he succeeded Soane as Architect to the Bank of England; in 1836 he became full Member of the Royal Academy, and in 1840 he was appointed Professor of Architecture in that Academy, which post he held till 1857, greatly to the benefit of the Students. As President of this Institute, in the years 1860-1, and as the first to receive the honor of Her Majesty's Gold Medal, his name will ever stand on our records as one of our most honored and respected members. Nor were his high merits less readily acknowledged on the Continent. He was Chevalier of the Legion of Honor, and one of the eight Foreign Associates of the Academie des Beaux Arts of France. He was elected member also of St. Luke's, at Rome; of the Royal Academies of Bavaria, Belgium and Denmark; of the Academies of Geneva and Genoa; of the Archæological Society of Athens, and of the American Institute of Architecture.

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* A facsimile of the original sketch for this work is published with this paper, by the kind permission of Mr. F. P. Cockerell.

I hasten now to invite your attention, and doubtless your admiration, to the valuable legacy of beautiful drawings which Mr. Cockerell left behind him. Of these, through the kindness of friends, and the zeal of the Secretaries, an ample and most interesting collection is presented to your view this evening. A critical notice of them now, I am sure you will admit to be out of place. I am not addressing tyros, to whom the beauty of these works has to be explained. You will admire the breadth of light and shadow which distinguishes his pencil, whether in the treatment of slight sketches, such as those made to explain to His late Royal Highness his suggestions for the disposition of the ground at Kensington, or in his more highly finished drawings. You will be pleased, too, with the delicate feeling and extreme beauty which distinguish all his designs for ornament. But these purely æsthetic merits it does not become me to dwell on when addressing you. I will limit myself to saying, that I trust the exhibition of so great artistic excellence will have a powerful and lasting effect on the studies of the rising generation of Architects. Let it not, however, be supposed that I would encourage the notion, commonly prevailing outside the profession, which regards excellence in drawing as the only essential qualification of an Architect. The Architect has very, *very* much to learn besides drawing, although certainly all that he learns will be of infinitely greater avail to him if the accomplishment of fine artistic drawing be superadded. I believe that much of the impotency of architectural design which marks the close of the last century in England, is due mainly to the prevalent absence of education in this respect among the architects of that period; for where there is little facility of drawing there can be little originality of design. In the beautiful restorations that are exhibited to-night, we see how admirably Mr. Cockerell combined the archæologist and the artist. No mere archæologist could have restored to life with so much success the mutilated remains of antique art; neither could any artist have hoped to accomplish so much, if he did not possess a profound knowledge of archæology. It is, I think, to the happy union of these high qualifications, together with his pains-taking and conscientious habits, that Mr. Cockerell was indebted for the eminent position he held as an expounder and illustrator of Greek archæology.

Let me now shortly advert to his great services in this last-named branch of science. His earliest triumphs were the discovery which he made, in company with several other distinguished travellers, of the Æginetan sculptures, and the frieze of the Temple of Apollo at Phigalia. Both these enterprises were accomplished in the year 1811, without any aid from Government, and at a time when the disturbed and lawless state of Greece made such pursuits extremely perilous. That this country should have failed to become the possessor of both these treasures is a matter ever deeply to be deplored. It may be worth while to detain you for a few minutes in mentioning the circumstances of this most unfortunate failure, circumstances which, I am sorry to say, reflect discredit on some of the parties implicated in the trans-action, though certainly none whatever on our own countrymen. It appears that by amicable arrangement among the discoverers, the sale of these marbles was placed in the hands of M. Gropius, the Austrian Consul, who united in himself the qualifications of an artist and a merchant, pending the question as to who should become the possessor. M. Gropius resided at Zante, but as that island was threatened with an immediate attack by the French, it was deemed expedient that the marbles should, for safety sake, be transferred to Malta. The Governments of England and of Bavaria both declared their desire to purchase, and whilst, on the part of the latter, M. Wagner was sent from Rome to bid, Mr. Taylor Coombe was instructed on the part of the British Government to attend the sale, and without fail to outbid his rival, for the Government were laudably anxious to have these treasures brought to the British Museum. The agents set out, but unfortunately the place of sale had not been defined with sufficient distinctness. M. Wagner proceeded straight to M. Gropius, at Zante, whilst Mr. Coombe went to the marbles themselves at Malta. While these agents were thus apart, the sale was effected by M. Gropius at Zante, at the time appointed, but without the benefit of competition, M. Wagner being alone in the market: the marbles were knocked down to him, of course, *nemine contradicente*, and I suppose at his own price. Had the result been otherwise, and had these remarkably fine examples of archaic art found a home in England, I think that one happy result, at least, would have been that sculptors would now have been enabled to study these models in the state in which the touch of time had left them, and not in that to which Thorwaldsen has brought them. I know little of the facts relating to the treatment of these marbles, except what a pretty close and careful inspection of them at Munich has taught me; but when we reflect that these broken and weather-worn fragments were disinterred after lying two thousand years thrown together in a heap, probably by an earthquake, and had to be packed on mule-back and carried over the mountains to the coast, and afterwards shipped to Malta, thence to be transferred by both sea and land to Munich, it appears nothing less than miraculous that we should behold them now as almost perfect statues, without visible fracture or fissure, and with a surface of marvellous perfection!

The scenes of Mr. Cockerell's chief labors in Sicily, were Syracuse and Agrigentum. In the former place he appears by his journal to have resided about three months, chiefly making studies of the Greek fortifications, which extend for miles in tumultuous ruin, over that interesting region. But it was at Agrigentum that he earned his most distinguished laurels. His natural taste for sculpture appears to have led him to take special interest in the fragments of colossal statues at the Temple of Jupiter Olympius, a stupendous building, the largest known temple in existence after that of Diana of Ephesus. Mr. Cockerell was the first to put them together, and to explain their purpose. Don Raffaelle Politi, still, as then, resident in Girgente, near the ancient City, had conceived that these colossi might have formed a sort of door post at the entrance of the Temple, but Mr. Cockerell proved them to be caryatides, forming an upper, interior, order or attic, and supporting the main timbers of the roof, as explained by the engravings in the supplemental volume to Stuart's work. Many years after Cockerell's visit, I found the Colossus still on its back, as he had placed it; and probably to this day it so remains, for the whole country has been dormant, until, indeed, recent political revolutions have proved that life is not extinct.

It would detain you too long to narrate the particulars of his second visit to Greece, during the years 1813 and 1814. In the first-named year he visited Canada. He made numerous sketches and studies during a tour of the seven Churches of Asia Minor, visiting Sardis, Laodicea, Philadelphia, &c. At the first-named place he was the first to take accurate dimensions of the Temple of Cybele. Towards the end of 1814 we find him in Italy, where he remained for three years, until his return to England in 1817. His agreeable manners, his artistic knowledge, and above all his ardent love and assiduous study of art, made him many friends in that land of art. At Naples, Pompeii, and at Rome, he found a rich harvest for his pencil; and when at the former place, eleven years afterwards, I found the memory of him still green among his fellow artists and admirers.

It was during a long stay that he made at Florence that he conceived the pedimental disposition of the Niobe group, which was at once received with great favor by Continental artists and archæologists, and was generally adopted by them. I believe that doubts have recently been entertained, by some of high authority, with respect to his design for the restoration of this group, although all, with one voice, admit its ingenuity. I will not here dwell on the singular beauty of Mr. Cockerell's restorations of Athens and Rome; they will, we may safely predict, survive the living generation, and never cease to interest the archæologist. His drawing, shewing to one scale all the architectural chef-d'œuvres of the world, and that which he devoted to the illustration of the works of Wren, are presented to you this evening, and are certainly among his most remarkable productions. It is needless, however, to dwell on these works, which are before you. We have not time even to name the various labors of his graceful pen. I cannot, however, refrain from a word or two of admiration of his last great work on the Temples of Ægina and Arcadia, published not much more than two years before his death, and illustrating the labours of his earliest professional years; that volume gives a sort of unity to his life, which cannot but be regarded with peculiar pleasure. "This work," to use the words of my friend, Mr. Charles Newton, an accomplished and most competent critic, "whether we consider the beauty, accuracy, and exquisite finish of the illustrations, the varied learning and profound knowledge of Greek art of the text, or the surpassing interest of the discoveries recorded, is one of the most valuable contributions to archæological knowledge that has appeared in this country. The whole work is pervaded with that fresh and lively enthusiasm, that bold and original conception of the ancient world in all its glory, which distinguished Mr. Cockerell's mind, and made us feel that if he had not been a great architect by profession, he might have embodied in *poetry* his profound sentiment of ancient art."

I believe that I have now sketched out the leading outlines of the life and achievements of this most excellent man. You will, I am sure, concur with me in considering that the present is not a fitting occasion to go into the minor details of his exemplary life, or to analyze the character of his art. Through the kindness of his family I might have laid open to you the very penetralia of his mind, and I am satisfied that the more intimately you became acquainted with him, the more highly you would esteem him; but the brevity which I think the occasion imposes on me, forbids my dwelling on the more delicate traits of his character; the kindliness of his disposition; the warmth and generosity of his heart. I would tell you how he labored for many years in furtherance of the Artists' Benevolent Society, and how deep an interest he felt, how active a part he took, in laying the foundation of the Architects' Benevolent Society; but all these are details which we must not enter upon to night.

If we stand back, as it were, and view his character as a whole, regarding only its salient and conspicuous points, we shall see that refinement of mind was perhaps his most marked characteristic; a delicate and fastidious discrimination was perceptible, not only in his professional works, but equally in his life and manners. It was perceptible in all he said and wrote, as well as in all he did. It influenced his feelings as well as his expressions. Who, among all who best knew him, can call to mind a single instance of ill-breeding? Nothing low or illiberal ever found harbor in his breast. A coarse expression of opinion never escaped his lips: a coarse idea never seemed to enter his head. He could condemn a delinquent, and that too in words of no ordinary force, but his condemnation was never tinctured with coarseness or abuse. We meet often enough with men who quite revel in invective, and who, if they fall upon an unfortunate offender, do not stop to weigh or measure his guilt, or to make allowance for redeeming or palliating circumstances, but will crush, tear, and shake the culprit to pieces with unflinching ferocity. Very far indeed from this was the habit and disposition of our friend. There was no bitterness whatever in his nature; he knew how to condemn, but he knew not how to vilify or vituperate. No one, it is true, felt more sensibly a mean or sordid action; he really loathed and abhorred it, and would resolutely turn away from, and utterly reject its author: but for the merely foolish man, or vain man, or the thoughtless or wrong-headed man, or peevish, ill-tempered man, all these he would smile at, but would as readily pardon.

Perhaps, however, there is no point in his moral character which shines out with more peculiar lustre than his sincere, constant, never-failing, never-changing friendship. How many there are that can bear testimony to this! Is there anyone, with whom he has been on terms of friendship, who can say that he was ever abandoned or neglected by him? We need no better proof of this, than the fact that very few ever had so numerous a band of fast friends. He had the power of attaching others to him, because they saw that he was honest and sincere in his friendship towards them.

So much have I said of his refinement of mind, as visible in his social demeanour and conduct. But I must not omit one other pleasing trait. We live in an age of the keenest competition. Johnson has compared the course of human life to a river, upon the surface of which a thousand barks are seen scudding before the wind. Some get stranded and lost upon shoals: some, driven by the impetuosity of their heedless, headstrong, course, are shattered against the rocks and sink: some are lost in whirlpools, which they might have avoided had they wisely looked ahead: some sink foundered, through the mere negligence or fatuity of the occupant: but hundreds of these little vessels are seen to perish from the injuries mutually inflicted on each other, by running an overbearing, selfish course, and fancying that they can best ensure the uninterrupted security of their own course by running down their neighbour. Such is human life as depicted by the great moralist, and such, too, is the type of each separate channel through which the tide of human life is running. Our own profession is itself as a river teeming with busy life; it requires very careful steering to keep a vessel on the even tenor of its way, however anxious the steersman may be not to inpinge upon his fellow voyagers. But see what conflict and confusion ensue when reckless steersmen do not keep that object in view! What discords arise! What evil passions are bred! What unhappiness results! But no such steersman was our late friend. I am pretty well acquainted with the whole course of his life, and I know not one instance when his high principle forsook him: not one instance of his having insidiously shouldered out a colleague, or of his attempting, by guile or finesse, to supersede a brother artist. In short, he was a gentleman in the largest sense of the word. He has left behind him an example of the highest value to all who, now or hereafter, may have a mind capable of fully appreciating him. He has shewn that a man's whole life may be absorbed in the pursuits of his profession, and yet he may retain to the last the most liberal and catholic views of it. He has, indeed, nobly vindicated that attribute of the Fine Arts, which has been accorded to them, with so much justice, at all the best periods of the world's history, as purifying, elevating and ennobling the human mind.

Mr. W. Tite, M.P., Fellow, rose and said, the usual motion which followed on occasions like the present, was that of a vote of thanks to the author of the paper which had been read; and he was quite sure he expressed the universal feeling in the room of grateful thanks to Mr. Smirke for the character of the paper itself, for the great pains he had taken with it, and for what he had told them of their deceased friend. But he himself rose for two special reasons—first, to state his great regret that, owing to ill health, he was unable to attend the funeral of his late friend; and, in the next place, that for a long period of his life he not only possessed the friendship of Mr. Cockerell, but that on some occasions he had had the advantage and pleasure of working with him. His friend Mr. Smirke had adverted to one incident which led to that association, as joint architects of a large public building, and which he hoped would be considered creditable to both. It was this—The London and Westminster Bank, then a rising and important establishment, wished to build new bank premises. The directors did not desire competition, as was the fashion of the day. At the same time there were, in truth, two architects in competition, viz., the late Mr. Cockerell and himself, and each had excellent friends upon the direction, who were severally desirous that their friend should be entrusted with the erection of the building. It occurred to him (Mr. Tite) that it was a most unworthy strife for two men, so placed, to be engaged in; and he submitted to Mr. Cockerell the proposition, whether he did not think they could act as joint architects, and so put an end to the contest. The reply of Mr. Cockerell was, that it would give him the greatest satisfaction to do so; and that if he (Mr. Tite) would propose the arrangement to his supporters, he (Mr. Cockerell) would take the same course. The arrangement was readily adopted by the directors: the work was rapidly completed, and in the end they received the compliments of the Board for the way in which it was accomplished. The outside of the building was marked by Mr. Cockerell's hand; the interior was more particularly his (Mr. Tite's). What belonged to him (Mr. Tite) had been much changed; but the characteristic style of architecture of the exterior had been preserved by him in all the extensions of the bank. This was an incident in his life, which he thought it might be well to mention, and thus to avoid personal and professional strife. With regard to the amiable social qualities of Mr. Cockerell, he had the best opportunities of knowing them. His intimacy with him was always marked with the most agreeable connections and associations. He was at all times a most excellent friend—a man of considerable conversational powers, of great learning in his art, and he was respected and esteemed by all who had the honour of his acquaintance. It happened, as well to the late Sir Charles Barry, as to himself (Mr. Tite) that in the two great competitions of their day, Mr. Cockerell was not successful. This incident, so far as he (Mr. Tite) was concerned, seemed to cool Mr. Cockerell's friendship; but it soon grew warm again, and as they grew older, professional differences were forgotten, and they were as good friends as ever. He would remark that he had always been struck with the great skill of Mr. Cockerell as a draughtsman; it was, in his judgment, one of the great secrets of his power. The large drawings of Antient Remains, now before them, showed the wonderful pictorial talent which their late friend possessed: but there was a drawing which he did not see, but which he knew particularly well, and which he once feared very much—that was a design for the new Royal Exchange, with four towers, drawn by Mr. Cockerell's own hand, in pen and ink, in the style of Piranesi, and of great power and effect.

[The President stated that the drawing alluded to was in the gallery below.]

He (Mr. Tite) saw Mr. Cockerell at work upon it before he himself was engaged in the competition, and he thought, as a work of art in connection with architecture, it was one of the most remarkable he had ever known. Allusion having been made in the paper to Mr. Cockerell's connection with Mr. Elmes in the building of St. George's Hall, at Liverpool, he would remark that, very much to his astonishment, he had recently read in a Liverpool newspaper that Mr. Rawlinson, the engineer, had succeeded Mr. Elmes as the architect of that magnificent building. He had known Mr. Rawlinson for many years as one who had earned distinction in his profession as a civil engineer, and lately as directing public works for the employment of operatives in the Northern districts; but at the time to which he referred, Mr. Rawlinson was a humble man, and, he believed, acted in the capacity of Clerk of the Works to Mr. Elmes, whose distinguished talent they all knew, and a young man for whom he (Mr. Tite) had the greatest regard. Mr. Elmes having succeeded in the competition for that great building—St. George's Hall—was anxious to obtain the help of men of greater experience than himself in carrying it out, and he sought Mr. Cockerell's and his (Mr. Tite's) advice. The information he was able to give was different from that which Mr. Cockerell was consulted upon. He (Mr. Tite) was appealed to on practical questions. Reference was made to Mr. Cockerell on other points. On one occasion, however, Mr. Cockerell said to him, "Elmes has been asking me whether I think the great hall can be roofed with brick and solid materials, instead of wood?" He (Mr. Tite) replied that he had recently been to Munich, where there was a church roofed with brick, an ellipse of very great span. The crown of the arch was not more than six or eight inches thick, but it stood well and without settlement. He (Mr. Tite) could therefore see no reason why, if that had been successful in Germany, this hall might not be covered in the same way. This opinion was communicated by Mr. Cockerell to Mr. Elmes. Soon after that Mr. Elmes died, and the building passed into the hands of Mr. Cockerell, who was appointed architect. Thus the idea of the brick roof was that of Mr. Elmes, but was carried out by Mr. Cockerell. He strengthened the abutments with piers. Mr. Rawlinson, it was stated, suggested that the bricks should be made specially for the purpose, wedge shaped and hollow, but hollow bricks were, as the meeting well knew, not new in principle. The actual superintendence of the work was placed in the hands of Mr. Rawlinson, which he (Mr. Tite) believed was all that gentleman had to do with the roof in question. Much of this he feared was like an old man's gossip, but by their cheers he was induced to believe the few incidents he had adverted to had interested them, and they might be useful as a guide to others in life; particularly in the learning which Mr. Cockerell brought to bear upon the architecture of periods in the world's history, which he and his friend used to study and admire, but which seemed at the present day to be a little out of fashion. He was not himself aware how Mr. Cockerell succeeded in Gothic architecture; for, although he had erected some buildings in that style, he (Mr. Tite) had not seen them. He should like to know how he succeeded at Harrow. If he was as successful in Gothic as well as in Classic architecture, he must have been a very superior genius; for even Sir Christopher Wren, great as he was in Italian architecture, did not do much for Gothic, which he disparaged. They had sustained a great loss, which he was sure they all felt deeply. A man of talent had passed from them—a man who illustrated their art by his published works, and adorned it by his life and practice. This would naturally lead them back to the point from which he had started, and coming to the resolution he had to propose, he would say that every friend of deceased worth would desire to have no abler biographer, or their lives recorded by a more "honest chronicler" than his friend Mr. Smirke. At the same time he would add, that there was not a word in this memoir to the truth of which they did not all bear witness; and though his friend in his modesty declined to consider himself an eloquent writer, he was certainly a most truthful one. He therefore begged to propose that the sincere thanks of the meeting be given to Mr. Sydney Smirke for the able and interesting memoir of their departed friend.

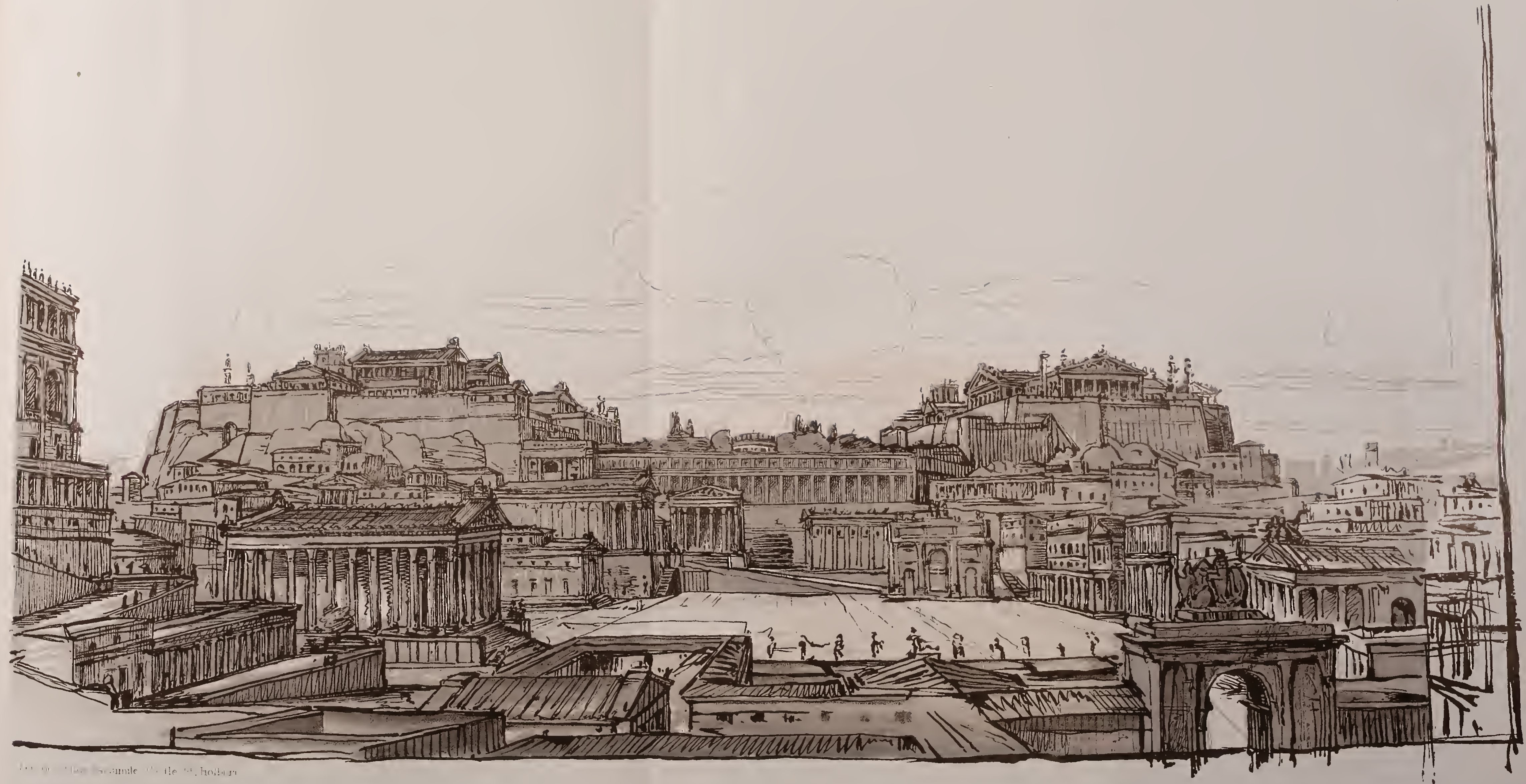
Mr. G. Gilbert Scott, Fellow, in seconding the motion, would not add one word to what Mr. Smirke had so happily and elegantly said of their departed friend, followed by what had been heartily expressed by Mr. Tite, on the same subject, with every word of which he felt sure that every one present must earnestly sympathize. He heartily thanked Mr. Smirke for his paper.

The President said, if for a moment he paused before putting the motion, it was not because he doubted that it would meet with a hearty response from the members present; but it was in order that another eminent member might rise to *second* the motion, and thus serve as an index of the mind and feeling of the Institute on this important occasion. There was an admiration of great men, which had been styled by Carlyle "hero worship," and which has by some been ridiculed. But such an homage was due when it had for its object a man like the late Mr. Cockerell. Allusion had been made to a point in that gentleman's character, which was very striking throughout his professional career, viz., the absence of that selfishness, which would grasp and concentrate to himself every possible advantage. He was a man of generous mind, and wished to distribute the advantages, which arose from the pursuit of a liberal profession. Mr. Tite had referred to the extraordinary skill of Mr. Cockerell as a draughtsman, as the secret of his power: whereas he (the President) regarded it rather as an index of the power, which existed in the mind, and to that he attributed his great success in his profession. He now proposed for their unanimous acceptance, that the best thanks of the Institute be given to Mr. Sydney Smirke for the elegant and truthful picture he had given them of the life of that admirable man, the late Mr. Cockerell.

The vote of thanks was passed by acclamation.

Mr. GILBERT SCOTT expressed a hope that the President would thoroughly urge upon the younger members of the profession the careful study of the exquisite and wonderful drawings from ancient architecture and sculpture exhibited in the room in which they were assembled. The more they were studied by the younger members, the more would they be incited to endeavour to render themselves in every sense of the word, *artists*, and might, he trusted, be led to pursue their art with at least some degree of the same ardour as was exhibited by their departed friend.

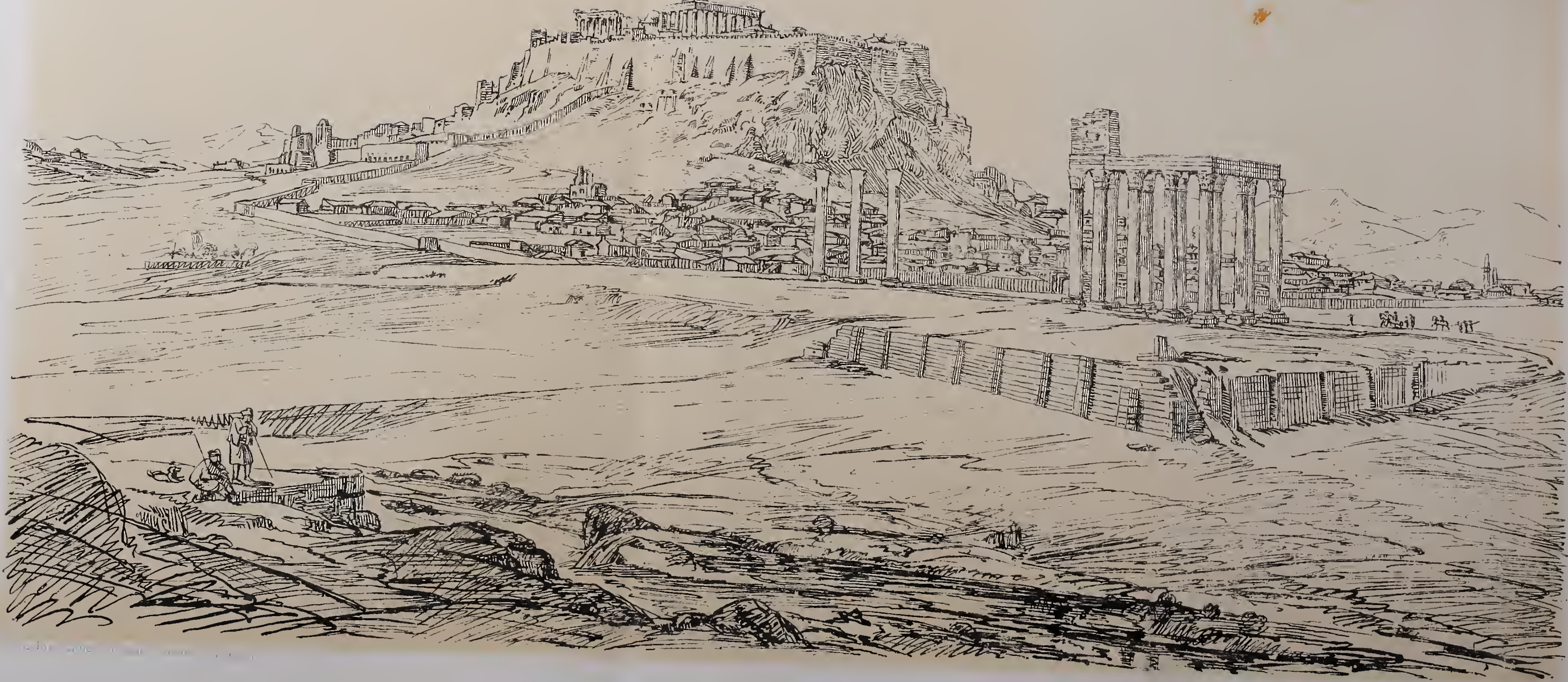
The PRESIDENT was quite sure the remarks of Mr. Scott would come home to all. He then announced that the Council, having been consulted by the Architectural Union Company, as to the disposition of accumulated dividends on certain donation shares, had recommended that a premium of twenty guineas should be offered for the best model in clay of some architectural subject combining vegetable and animal forms.



[illegible] Facsimile [illegible] Holborn

FACSIMILE OF THE FIRST STUDY FOR Mr COCKERELL'S RESTORATION OF THE ROMAN FORUM, MADE AT ROME IN 1817

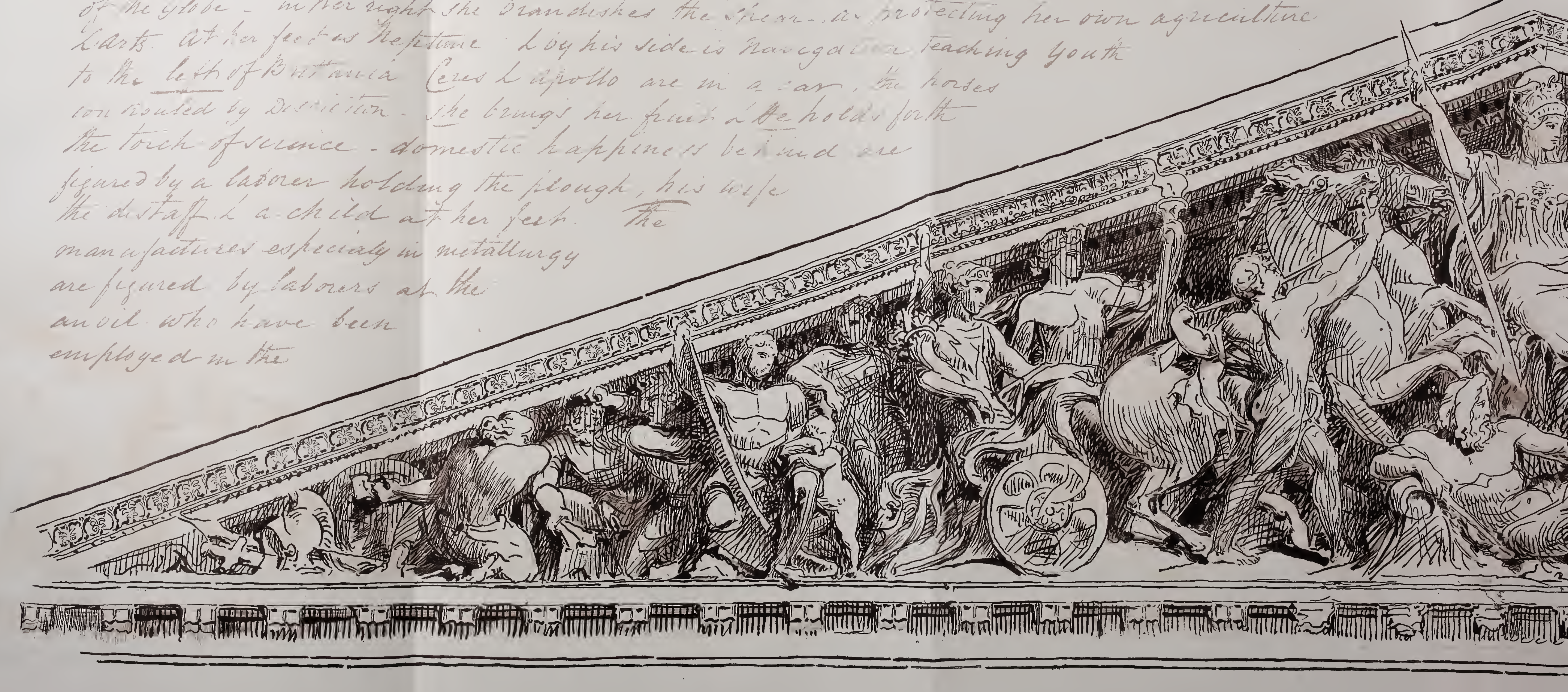
FOLD
OUT



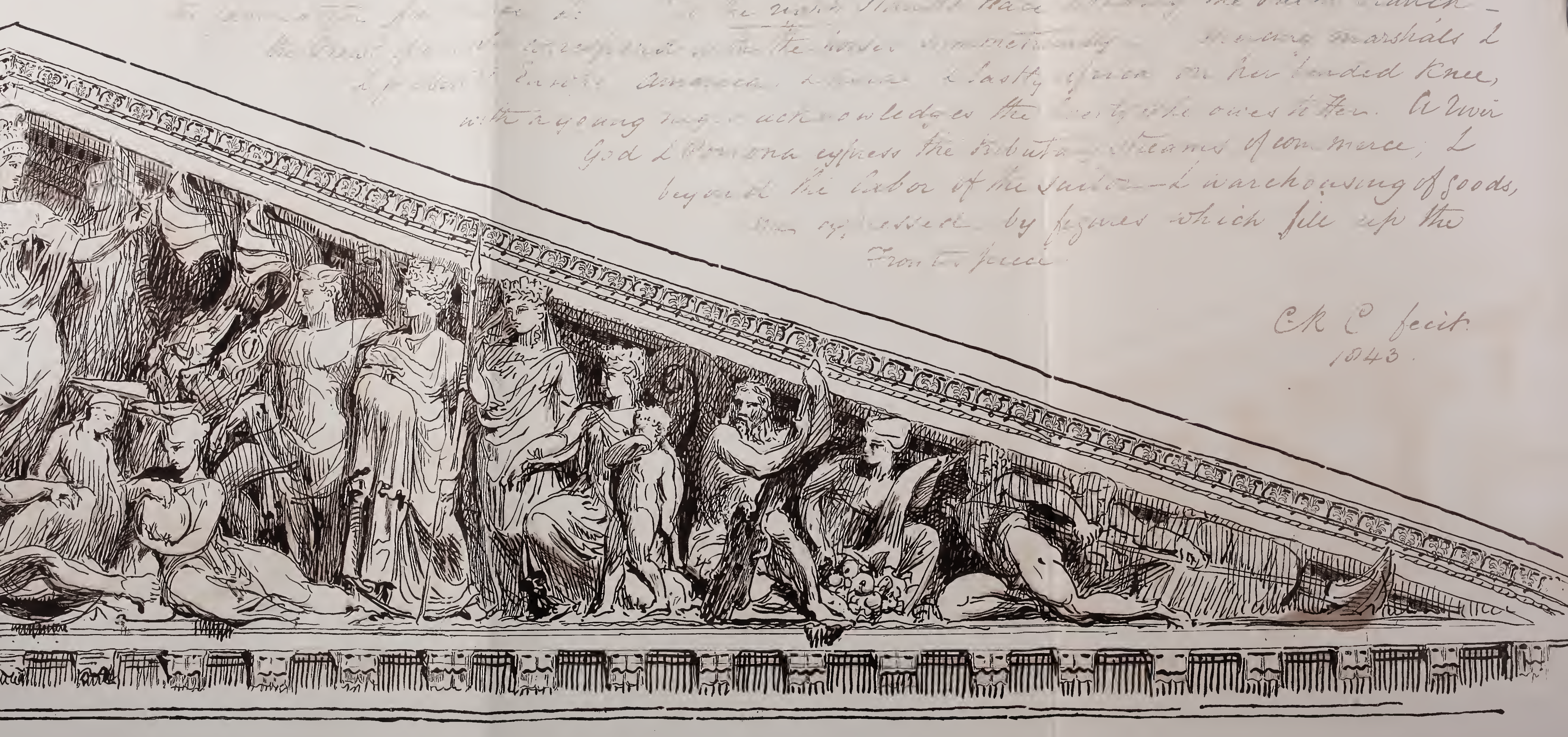
VIEW OF THE TEMPLE OF JUPITER OLYMPIUS & THE ACROPOLIS AT ATHENS

FACSIMILE OF A TRACING PREPARED FOR THE ETCHING ON COPPER WHICH Mr COCKERELL EXECUTED AT ROME IN 181

In the middle Britannia is enthroned — in her left she holds out the Olive Branch to the four quarters of the Globe — in her right she brandishes the Spear — protecting her own agriculture & Arts. At her feet is Neptune & by his side is Navigation teaching youth to the left of Britannia Ceres & Apollo are in a car, the horses conducted by Discretion. She brings her fruits & beholds forth the torch of science — domestic happiness behind are figured by a laborer holding the plough, his wife the distaff & a child at her feet. The manufactures especially in metallurgy are figured by labourers at the anvil who have been employed in the



Idea for the Frontispiece of a



In commemoration [illegible] To the right stands Peace holding the Palm branch —
the [illegible] the [illegible] commercially [illegible] marshals &
[illegible] Europe America, [illegible] & lastly Africa on her bended knee,
with a young negro acknowledges the liberty she owes to Her. A River
God & Pomona express the tributary streams of commerce; &
beyond the labor of the sailor & warehousing of goods,
are expressed by figures which fill up the
Frontispiece

C.K.C. fecit
1843.

Publick Building in England.

CHRONOLOGICAL LIST OF DESIGNS AND DRAWINGS BY THE LATE CHARLES ROBERT COCKERELL, ESQ., R.A.,

Selected to be Exhibited at the Royal Institute of British Architects, November, 1863.

Designs made in Italy for a Palace for the Duke of Wellington. *Plans and Elevations*	1816
Bristol Philosophic Institution. *Plans, Sections and Views*	1818
Harrow School, New Wing, Speech-room, &c. *Plan and Elevations*	1818-1820
View of the Roman Forum, restored*	1819
Mansion at Oakley Park, for the late Hon. Robert Clive. *Plans, Elevations, and Details*	1819-1824
View of the Parthenon at Athens, restored	1820
Hanover Chapel, Regent Street. *Plans, Elevations, Views, and Details*	1821-1824
St. David's College, Llampeter, Cardiganshire. *Plans, Elevations, and Views*	1821-1827
Chapel and Mausoleum at Bowood, erected for Lord Lansdowne	1822
Mansion for Mr. J. L. Naper, at Lough Crew, Ireland. *Plans, Elevations, Views, and Details*	1822-1829
Additions to the Grange, in Hampshire, for Lord Ashburton, New Dining Room, &c.	1823-1825
House at Dery Ormond, for John Jones, Esq.	1824
View of Athens, restored.* *(A companion to that of the Roman Forum)*	1824
National Monument on the Calton Hill, Edinburgh. *This was designed on the model of the Parthenon, at Athens, and of the same size; the porticos and vestibules were adapted to the reception of commemorative statues, and the interior to the purposes of a church*	1825
University College, Gower Street. *Competition design*	1826
Mansion for Mr. Farquharson, at Langton, Dorsetshire. *Plans, Sections, Elevations, and Details*	1827-1833
The Duke of York's Column. *Competition design*	1829
Designs in competition for the Cambridge University Library and Museum, with Mr. Wilkins, Mr. Decimus Burton, and Messrs. Rickman and Hutchinson. This competition partially failed; Mr. Cockerell's designs were highly approved, but Messrs. Rickman and Hutchinson's were chosen in consequence of Mr. C.'s departure from the programme of the Syndicate, who required that the centre of the ground in front, between the Senate House and the fence next to King's College, should fix the axis of the building. Mr. C. made the design, No. 1, partly on that principle; but in the more finished design, No. 2, he took advantage of the width of the site, and filled the ground so as to get the quadrangle nearly 100 ft. square, instead of 100 ft. by 60 ft. as the programme would have made it. This gave rise to many criticisms on Mr. Cockerell's and Mr. Rickman's designs, and a number of pamphlets (which are to be found in the library of the Institute) were issued on the comparative merits of the two, with others by Mr. Wilkins: and, finally, in 1835, the same parties were again invited to compete, and Mr. C. offered his third design, which was chosen, and the North Wing was proceeded with. In the interval of the two competitions the Theatre shewn in designs Nos. 1 and 2, had been executed in another part of the University, so that it was not required in the third design.	1830-1835
Proposed Granite Pedestal for the Warwick Vase, Cambridge	1830-1836
Westminster Life and British Fire Office, in the Strand	1831-1832

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* Fac-similes of original sketches of these noble drawings will be published in the future parts of the Transactions of the Institute for the present Session.

Theatre of Pompeii, restorèd, as it may have appeared between A.D. 63 and 79	1832
Design for Falkland Palace, for Mr. Bruce, (not executed). *Plans and Elevations*	1833
New Houses of Parliament. *Competition design*	1835
Lithographic View of the Interior of the Dividend Pay Office at the Bank of England, built by Mr. Cockerell. *Afterwards pulled down by him to make way for the present Private Drawing Office*	1835
Four Lithographs of Bassi-relievi, executed by Mr. Rennie for the same	1835
Design for the Houses of Parliament. *(Competition)*	1835-1836
Reform Club, Pall Mall. *Competition design*	1837
London and Westminster Bank, erected under the joint superintendence of Mr. Cockerell and Mr. Tite	1837-1839
Chapel at Killerton, Devonshire, for Sir Tho. Dyke Acland, Bart.	1837-1840
Harrow School Chapel (taken down in the year)	1838
Tribute to the Memory of Sir Christopher Wren	1838
Royal Exchange. *Competition designs*	1840
Sun Fire Office. *The building was begun according to the design No.* 1, *afterwards the City required the Threadneedle Street front to be set back to widen the street, and the angle to be taken off*	1840
Taylor and Randolph Galleries and Library, Oxford. *The drawings on strainers were those sent in competition. Other studies and drawings of the building as executed*	1841-1846
Branch Bank of England at Manchester. *Studies, and Elevation as erected*	1844
Branch Bank of England at Bristol. *Elevation as erected*	1844
Carlton Club, Pall Mall. *Competition design*	1844
Branch Bank of England at Liverpool	1845
Pen and ink sketch of a Pediment for a Public Building. *Mr. H. L. Elmes, the Architect of St. George's Hall at Liverpool, who sought occasional advice from Mr. Cockerell in carrying out his great work, saw this sketch, and recommended it to the Corporation, for the South Portion of the Hall; it was executed as shewn in the lithographed view**	1846
Fitzwilliam Museum, Cambridge; designs for the finishings of the Central Hall, made after the death of Mr. Basevi in the year	1846-1847
The Professor's Dream; a Synopsis of the principal architectural monuments of Ancient and Modern Times	1849
Designs for the Interior of St. George's Hall, at Liverpool, finished by Mr. Cockerell, after the death of Mr. Elmes in 1847. *Views of the Hall, Organ, &c.*	1851-1854
Liverpool and London Insurance Buildings at Liverpool	1855-1858
Restoration of the Mausoleum at Halicarnassus.	1858
Restoration of Pompeian House.—View of the Kiosk of Ali Pacha at Janina.	
Approaches to London Bridge. *Sketch design.*	
Views in Greece.	
Drawings of the Frieze of the Temple of Apollo Epicurius, at Phigaleia. *These sketches were sent to England to be laid before the Government, as an inducement to secure the Marbles for this Country*	
Pediment of the Temple at Ægina—etching. Pencil studies of the sculptured Marbles.	
Sketches of Design made at the desire of the late Prince Consort, for the proposed Galleries and Museum at South Kensington.	

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* A fac-simile of this drawing accompanies this paper.

NOTES ON NEWLAND CHURCH, GLOUCESTERSHIRE, WITH REMARKS ON CHURCH RESTORATION AND ARRANGEMENTS.

By William White, Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, November 30, 1863.

I have been asked to give a detailed account of Newland Church, in the Forest of Deane, and of its restoration. To me it is no easy task to frame a sufficiently vivid description either of the building itself or of the work effected. The history of the church, however, is instructive, and at all events I may hope that what I shall be able to bring before you may not be without its interest. But whether I weary you or interest you, the blame or the thanks must be laid upon your zealous and indefatigable Secretaries, who will give one no peace till the duty which they have imposed has been performed. They will find to their dismay that the spirit which they have invoked is more easily raised than allayed, for I shall take the opportunity of enlarging upon certain points of church restoration and arrangement in a more detailed manner than may at first sight seem needful or advisable. Decided as are my views on some of these matters, and strongly as I may express myself, far be it from me to imply a censure either of the persons or the views of those who may be so unfortunate as to differ from me in the matter of church arrangement. But I do, nevertheless, feel bound earnestly to advocate that which I believe to be the life and soul of church architecture, and by all means in my power to promote the diffusion of those principles upon which experience has taught me to place so high a value, and which form one great desire and aim of my life to set forth in a fair and proper light.

I do not profess to be a setter forth of new views, or of views of my own—I only seek to urge upon the notice of such as have not yet fully considered them, a few of the principles which ought to be our guide; and I feel sure that such as have learned their worth will, for the sake even of a few who have not, bear with what may be to them only an old story twice told, but told now in new words and with all the force that can be applied to it by one who feels deeply his desire, but withal his inability to plead for those principles as they deserve.

Having warned you of what is in store I must now turn to the special subject of this evening, viz. my notes upon Newland Church. Newland is situate about four miles S.E. by S. from Monmouth, and about six miles West from Lydney Station. The navigable Wye forms the western boundary of the parish. The Royal Foresters are very jealous of the name of their mother church. You will observe that I do not call it New′lănd. This is the name of a village about thirty miles distant, in the adjoining county of Worcester. But it is New-lānd′. I take the origin of this peculiarity to be connected with its attachment till within these few years to the Welch See of Llandaff, and I suppose that its second syllable is properly "Llan" rather than "Land," in spite of its being found in conjunction with the Roman prefix of "New."

The Church of Newland then, dedicated to All Saints, is one of the finest and most interesting in the "Royal Forest." It is the mother church of Coleford, Clerewell and Bream. According to Sir Ric. Atkyns S. Briavel's also was included in the parish anciently. The church has been described as "standing on very elevated ground, overlooking an extensive tract of country in which thickly wooded "slopes, rugged rocks, verdant meads and peaceful vales are thrown together in picturesque confusion "and gorgeous luxuriance. From even almost the lowest valley the heaven directed tower is seen to "over-top the richly timbered heights; while viewed from more elevated positions it seems to stretch "upwards—though the church is not very high—with a lofty grandeur that dwarfs all surrounding "objects." This description though somewhat stilted is hardly exaggerated, and the warm deep grey of the masonry stands out in pleasing and striking contrast with the forest green. Indeed there are very few of our country villages able to boast of so magnificent a church, with so clear and interesting a history. The church appears to have received successive additions almost from its first foundation. It is grand in plan and picturesque in outline. The general plan consists of a fine chancel with an arcade of two on either side separating it from the Gage aisle or chapel on the north and the Dunraven aisle on the south; a large and lofty nave with clerestory, terminated at the west by a grand tower; very broad and masculine north and south aisles separated from the nave by arcades of five. The north aisle is separated by an arch from the Gage aisle. The south aisle is almost continuous with the Dunraven aisle. There is a south porch, by the side of which stands the Probyn aisle, a mortuary chapel connected with the south aisle by an arch of two orders. There was also a large but very poor modern vestry to the north-east.

Having now sketched out a description of the church, I must lay before you a few particulars as to its history, after which I shall endeavour to trace out and connect with its history the architectural features presented by the building itself. I shall then say something of its state before restoration, and give an account of what it has been necessary to do, and of what has been done. I purpose then adding a few words, as I have already intimated, upon the general principles of church restoration which such a church as this are calculated to suggest, together with some remarks upon church arrangement as bearing upon the subject of church architecture.

"There is record of the first building of this church in 20 Henry III. (A.D. 1236). The first "partial endowment of tythes was in the reign of Edward I., a larger one in Edward II., and there was "a grant of estates in Edward III. There is also mention of the rise of a family named Hall, who is "said to have enlarged the church in Henry VII.

"The church originated in a neighbouring hermitage, which again had its rise in the flight of a "British chieftain from the battle of Bangor Iscoed, in Flintshire, in the sixth century. Again, the "conversion of this chieftain was connected with the preceding visit of S. Germain to this country, and "with the foundations left by him, and by some other missionaries from the country about the Loire.

"There was a Welch or Irish tribe in the neighbourhood, afterwards supplanted by a Breton tribe, "and these again by a Norwegian or Danish settlement, and all these traces were crossed by Anglo-"Saxon footsteps, and at last swept over by the Anglo-Normans. Besides this there were unmistakable "traces of Roman settlement." For this information I am indebted to the research and kindness of Mr. Fryer, of Coleford, who may, I hope, be induced some day to give us the result of his investigations as connected with the fragments of other architectural antiquity found in the neighbourhood. It would be interesting to trace the foundation and spread of that spirit which appears to have slumbered so long, working with slow and steady steps, leavening the country with its influence, and at last bursting out into the glow of devotion which called forth from the dust so noble a structure as Newland church; for, as appears sometimes to be the case, the first seed from which this church sprung was sown by strangers in a quiet sequestered spot, free from the haunts of men, to serve for the devotions only of a few religious recluses.

But when this church was built it was planned essentially as a parish church, for the accommodation of large and increasing congregations. It was arranged so as to be capable of extension, and it did undergo alteration and great addition within a few years of its foundation. To it flocked, no doubt, the scattered population of Foresters who at that time must have inhabited the neighbourhood in great numbers.

The dedication itself suggests the probability of there having been a Christian community there for many years previously to the building of the church, who were interred, perhaps, in this very spot, and who now were to be remembered by their children's children year by year in Christian commemoration, that so their memorial might be handed down to posterity and form a link in the never ending chain of association. And I do not know a district where all classes, whether churchmen or nonconformists, take the same lively interest as the Foresters do in decking the graves of their dead every year, chiefly on Palm Sunday, with garlands of flowers and evergreens, or take the same uncontrollable pride in their mother church, notwithstanding that their un-endowed villages, or rather towns, have been left to themselves and to unauthorised ministrations till within the last few years. The venerable vicar, who had the happiness of celebrating his parochial year of jubilee by the re-opening of his restored church, appears to have been the first to take any very active step in the many good works that since the commencement of his ministry have been carried on in the now sub-divided parish.

It has been supposed that the original church of Newland was on a very small scale. I can, however, see no indication of this, but, on the contrary, there is every appearance of its having been planned upon an unusual scale of magnificence in size, though so simple in treatment and detail.

The 20th year of the reign of Henry III. (A.D. 1236) was given in the information I have above quoted as being the date of the first building. But it appears that the crown grant of land for its site is dated in the 3rd year, and that grants of oak were made for it in the 5th and 7th years of the same reign. It appears that a grant of tythes was made to the Bishop of Llandaff, in the 1st of Edward I., and of lands in the reign of Edward II. to Sir John Wysham, and in the reign of Edward III. to Sir John Joce, to whose memorial I shall presently refer. The hermitage before spoken of was granted away in the 4th of Henry III. as a grange to the Abbey of Grace Dieu in Monmouthshire, and from this time may be said to date the arrangements for the commencement of the church by Robert Wakering, a royal chaplain, aided by Radulphus and Philip, two chaplains from a hermitage at Stow Grange. The extent and exact position of the original building has been much questioned, and of course can be only matter of conjecture. I naturally conclude my own conjecture to be the only right and true one. Some have concluded, I know not why, that it "comprised only what is now the north aisle, with its chancel at the east end." This, however, is impossible; for the north aisle is essentially an aisle complete in itself, it had a window at its east end, the jamb of which still remains, prior to the erection of this eastern chapel. The date of this chapel is therefore later, though probably earlier than that given by Sir R. Atkyns, who speaks of it as founded by Robert Grinder and Joan his wife, in the 24th of Henry VI. (1446). To me it seems very clear that the chancel and the present nave were first built, with preparations made for the subsequent addition of aisles when time and funds, or other circumstances, should allow. The north aisle was accordingly then added; and after this, the south with its porch soon followed. After these came the tower at the west end, late in the same century. For this, also, preparations had been made. The Dunraven aisle followed some fifty years later. It must be observed that no preparation had been made for these chancel aisles; they formed no part of the original plan.

The only other additions were the Gage aisle and the Probyn aisle, in the twenty-fourth year of the reign of Henry VI., at which time also the chancel underwent considerable rebuilding. The clerestory must have been added about A.D. 1600 or later, when also a few other minor alterations were effected. But the roofs generally must have been renewed from time to time about this period, following to some extent the more ancient forms.

I have given a consecutive sketch of the architectural history of the church, rather than break in upon my narrative with proofs or indications of the respective alterations and additions. It is now necessary to support what I have advanced by the architectural evidences, which appear so far as I can see satisfactory and conclusive; my only fear is that I may be unable to make the explanation so clear to others as it is to myself.

There is nothing in the chancel to which we can definitely point as being a portion of the original structure. But we know that a nave would not have been built in those ages without a chancel. The indications of earliest character are in the nave arcades. But in taking down the east gable of the chancel the portions of a sill were discovered, evidently belonging to a window of early date, although there was nothing to define what that date was. We come therefore to the nave arcades. Now the church appears to have been fifteen years in *commencing* after the site was given, and a grant of oaks made for its erection. Time was thus allowed for cutting and seasoning the oak. And the work was probably carried on by only a limited number of local artificers. We are led to suppose from this that the building itself would not go on with extreme rapidity, and it was probably, as I have said, carried out by slow degrees; and hence, although the detail of the aisles themselves indicates the date of the latter end of the thirteenth century rather than the middle, they may well have been merely the lengthened continuation of the great work commenced in A.D. 1236. There is nothing perhaps particularly marked or striking in the simple detail of this arcade to enable us to decide its exact date. But the vertical profile of the cap and base mould is an indication of its early character. This however appears to have been followed to a considerable extent in the later cap moulds. Still there is a sufficient difference between the earlier and the later to enable us to say with some certainty that these are of the date named. The pillars are octagonal, and the arches simply recessed-chamfered of rather massive character. There is a slight difference between the north and the south arcades in the height of the arches and level of the bases, as well as in the detail; as *e.g.* in the south arcade the chamfer is stopped out. Its pillar is shorter, and its arch higher. The abacus projects at the sides, as well as at back and front. There are relieving arches over the southern arcade of thin flat stones and the outer or southern side of this wall appears to have been built with greater care than the inside, in order to allow of its presenting, for the time, an exterior well finished face till the south aisle should be built. It also is built of small thin well packed walling stones indicating that it is of earlier date than the other work. Over both of the arcade walls was a good deep corbel table hung out ready to receive the roofs of the aisles, when these should come to be added, without breaking in upon the walls or roof of the nave, which was in itself complete, and as yet without a clerestory. These corbel tables again exhibit about the same amount of difference as appears between the two arcades.

It is absurd to name positive dates for what is mere conjecture, but in order to convey to you an idea of my own impression regarding these dates, and of the general successive periods of the several parts, I may without pretensions to accuracy, say, that the south arcade was finished in A.D. 1245, the north arcade in 1255, the north aisle in 1270, and the south aisle in 1280, when the tower immediately followed. There is but little difference of character between the two aisles, but there is just enough difference in the measurements of the detail and treatment, to make it probable that the one was a few years earlier than the other. The difference consists not so much in the treatment of the window tracery, as in the splays of the jambs, the chamfers of the monials, and section of the labels. The pitch of the roof of the south aisle moreover was steeper than that of the north. On *this* account it might have been supposed to be the earlier of the two, were it not for the stronger indications of finish to the exterior face of the wall. There is a question relating to the chancel arch very difficult to determine. It was evidently rebuilt at an early period; for at the back of its northern jamb is the starting of a previous jamb of similar character and plainly *in sitû*. The east end of the chancel inclines slightly to the south. The southern as well as the northern jamb is thrust to the southwards. The one-sided effect of this is somewhat neutralised by this jamb being carried up only in one order, the inner order of the arch being carried on a tapered corbel, the south side being in two orders and thrust as far as it can go into the pier of the arcade of the Dunraven aisle. Possibly the chancel arch may have been rebuilt of its old material when the Gage aisle was added (A.D. 1446) when also the rood staircase appears to have been built, thrusting the pier as it were out of its place. This is ingeniously corbelled over to carry the abutting arcade of the Gage aisle. The arches, however, into this Gage aisle appear to be of earlier date than the aisle itself would lead one to suppose; and possibly it was not built but rebuilt and endowed by Robert Grinder with its £12. a year. The section of its western arch agrees in character with that of the chancel arch, whilst its side arches more closely follow that of the nave arches. It is not unlikely that it was in the first instance a narrow aisle, and afterwards enlarged to its present size. Its trellised parapet is yet later still, but this may have been a kind of reproduction after an earlier one.

Sir Richard Atkyns says that the south chancel aisle was founded by Sir John Joce in the reign of Edward III., by the owner of Cowerwall—Clerewell I suppose—and that it still in his time belonged to the family of that place—as indeed it does to the present proprietor of Clerewell Court—Lady Dunraven. It must have been built early in his lifetime. It had, however, undergone several alterations. It contained a square headed window which might have dated from A.D. 1550, not in its original position but reset in the more recently rebuilt wall which had been thrust out by the pressure of the roof. The east window of the Dunraven aisle is five-light of a single order, chamfered; its tracery is uncusped, intersecting, of the simplest description of middle pointed work. It has a fine massive inner arch rib. The window is 12 or 14 inches out of the centre of the gable, to the north of it. This cannot have been for the sake of effect or of the perspective inside; but was probably occasioned by the remodelling of the gables when the roofs were renewed. For this roof appeared older than that of the nave aisle—not an original roof nevertheless—and the roof of the nave aisle had been framed and forced into a line with it subsequently to the removal of the arch separating the two aisles. There was no corbel table prepared on the side of the chancel wall, but only a single corbel subsequently let in for the reception of this roof, which was clumsily and insecurely supported upon some longitudinal pieces bearing east and west. Moreover, it is the ridge which is crooked, not the window; the window inside is midway between the walls. It may have been in order to obviate some of the one-sided effects of the short leg of the gable as compared with the outer.

The porch is fine and large, of somewhat remarkable treatment. Its outer entrance was protected in former times by large folding doors, in order to shut out the fierce south-west storms, and possibly also to resist attack. Close by this main entrance was a small side door in the eastern wall of the porch for use when the large doors were closed. The outer and inner main doorways are nearly alike in size and form. They are of very broad proportions, and have segmental pointed heads. Their section shews a moulding consisting of recessed quarter round. The outer doorway is simply of two orders, with a soffite rib, whilst the inner one, which is also of two orders, has plain jambs and inner arch as usual. Over the outer doorway is a single-light window, and over the inner doorway a kind of recess half filled up with a projecting narrow ledge on rubble stonework, whose purpose I cannot quite divine. These openings are cusped with soffite cusping of somewhat earlier character than the cuspings of the windows, which have feathered cuspings of small depth, whilst one of these is soffited and the other solid. By the side of this porch rises the short ridged, but high pitched and picturesque gable of the Probyn aisle—which is called, I believe, King Edward's Chapel in some old documents. The last incumbent of this chantry was Edward Fryer. Whether the present family of this name, whose burial place is close adjoining on the outside of the wall, is connected with him, I know not. This is popularly reported to be the chapel of the Joce or Joyce family. But it must have been erected much later than the altar tomb to his memory; and authority as well as architectural detail are in favour of the Dunraven aisle being the one founded by him. It is possible, however, that the Dunraven aisle was built and endowed by him in his early days, and that this was founded after his death to his memory.*

We now come to the tower. The eastern wall of this to a certain thickness must have been carried up with the nave, for there is the water tabling of the original nave roof still to be seen. The tower itself as it stands, however, cannot have been carried up at the same time, but this eastern wall must have been cased when the main body was built. For the tower itself is built of large squared ashlared stone work, with enormous flat buttresses, and a deep spreading plinth,—and the wall above this water tabling, which must have been at that time external—forming as I suppose a gable—is of smaller stone work, and not in any way corresponding with the other. The tower window is deeply recessed, both inside and out, with recessed quarter round moulding and monial. The only portion cusped is the vesica-formed quatrefoil in the head. The character of this cusping agrees with that of the other windows very nearly. The upper two stages are of later date. The lower stage is about 14 feet square, and the walls above 6 feet thick. The character of the tower arch is very much that of the chancel arch, but it consists of three sub-divided orders instead of two simple orders. About 9 feet from the floor is a row of stone corbels, for the erection of a ringers' stage—reaching less than half way up the height of the opening. These must have been built in at the time of the erection of the tower, in order to save length of pull for the ropes. The character of the lower part of the tower externally is very similar to that of Lydney in the same neighbourhood, and the west window in Lydney tower has a very strong family likeness to that over the south porch entrance of Newland church. The parapets and pinnacles of the tower have been modernized; but their mass, being built upon their old bases, is still very effective. The staircase turret is at the south-east corner of the tower.

The font stood near the tower; it is of seventeenth century date, but may have been cut out of the old font, judging from its massive proportions.

There is throughout the church an entire absence of buttress in the old parts. This is not uncommon in early churches on a smaller scale—more especially in the West of England. Some modern buttresses had been built in order to support if possible, the failing wall of the north aisle,—but in vain.

A few fragments of stained glass remained in the east window of the Dunraven aisle, and have been replaced. There were also a few fragments of encaustic tiles, which have been introduced into the pavement. There is a remarkable lack of piscinæ or sedilia for so large a church, there being only one piscina, in the Dunraven isle. The chancel walls had, however, I am persuaded, been rebuilt.

Having discussed the architectural history of the Church, we must now turn to its architectural state, past and present. I shall not repeat the oft-told tale of damp pavements, and close pews, and family galleries, with private stoves, but will pass on at once to its condition, merely saying in passing that this was more than commonly offensive in many respects. Of the vaults, floors, and fittings there is but little to say, except that the pavements declined considerably to the North, following the fall of ground, as often is the case in churches on the slope of a hill; and this involved some difficulty of treatment in the retention of this inequality, which was the more necessary in consequence of the heights of the door-sills and their jamb-stones agreeing therewith. And although it became necessary to rebuild the North wall entirely, I did not feel justified in making any difference of height in this respect, for this would have altered the relation of the height of windows and wall to the arcade opposite them to an extent that would have made the rebuilding a faithless one. To this wall, however, I thought it needful to add two buttresses, one at the end and one about the middle. The proportions of this elevation were such as to render a buttress between each window quite inadmissible. It also proved necessary to rebuild portions of the South aisle and Dunraven aisle walls. But the most serious work was the rebuilding of the south pier of the chancel arch, which, together with the whole south side of the gable, had become dangerous from spreading to the south, in consequence of the removal of an arch, corresponding with one in the north aisle, which formerly formed an abutment to it. There remained only the ragged fracture of the wall, showing where it had been; there was nothing to show its height or span. It was afterwards found necessary to rebuild three of the arches on the south side and two on the north, in consequence of the great inclination of the walls and serious settlement. This, however, was safely effected, in exactly the same form as before, excepting that in one of my visits I found the stone-cutters engaged in not merely taking off the white and colour wash from the stone, but in dressing down all the little inequalities of the chamfers and octagons of the pillars, caps and bases,—one of the very features giving them a character different from the later work, which appeared more regular and less rude. In answer to my remonstrances and denunciations for acting contrary to express orders, I was told they were at any rate "erring on the right side."

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* I find that this was founded by *bequest*.

It proved necessary too to rebuild the eastern gable and part of the side walls of the chancel. I said that in the taking down of the old gable the portions of the sill of the earlier window were found. These were again replaced in their exact position. For the new east window I did not have the old Perpendicular one, which was a fine one, reproduced, for reasons which will appear presently; but I may add here that it was past restoration; and that, as you will have seen, the whole of the church from west to east had still retained its earlier character, except this window. And the same with regard to the clerestory, which was a very poor and bad one, and had arrived at a state of decay scarcely capable of sustaining its roof.

Upon my first inspection of the old roofs of the aisles, there seemed, so far as could be seen from the space above the ceiling, every reason to hope that they might be saved, although, from want of tie, they were evidently still spreading. I had provided for ties and for new wall plates, trussed so as to relieve the lateral thrust; but when the stone tile and the plastering came to be removed, that which had appeared sound on the visible surface proved so decayed as to be incapable of hanging together, and many of the couples actually broke with their own weight upon removal, and there was but little of the old oak that would use up again, and this only in short lengths. The old roof of the south aisle had either been renewed, or else had sunk to be about 2 feet lower at its ridge than the gable wall showed, perhaps partly both. The line of the ridge too of the south aisle was broken to a marvellous extent, like the contour of a distant range of hills. These roofs were framed of couples, which had been afterwards braced diagonally beneath to increase their strength. They were framed without principals, and considerable portions had been renewed from time to time. In longitudinal section some of the couples were slanted to the eastward, and stayed by upright couples framed into them, as is not unfrequently the case in such roofs. Both nave and chancel roofs had tie-beams, but these had sunk in the middle to such an extent as to throw their ends entirely off their bearings, leaving a space of several inches in height between them and the notchings of the wall plates, which they were intended to bond. These had in consequence spread considerably, carrying the walls with them. The Gage aisle had a flat roof of lead; this was recast and laid upon a similar roof. This roof had been lowered and remodelled, with partial renewal about the middle of the seventeenth century, when it had been brought below the arched head of the window, which I shall refer to directly. New roofs, therefore, were required over the whole building. Nearly the whole of the interior plastering required renewal; but I pointed such portions of the walls as appeared to have been built with the intention of pointing, and could well be finished thus. This has the advantage not only of showing the original masonry, but also of obviating some of the unpleasant effects of huge spaces of plaster surface. Such of the windows, doors, and other dressed work as were capable of restoration, without entire renewal, have been restored stone by stone. I was, however, sorry to find in the case of the Probyn aisle window, that the stone-cutter had destroyed instead of restoring the traceried head, and had worked a new one, on the ground that the old one was so irregularly cut that it was "more trouble than it was worth to reset it."

When the modern vestry was taken down, a good and somewhat peculiar east window of Perpendicular Third-pointed date was found in the Gage aisle. This has been restored and filled in with stained glass. The whole of this east wall was covered with modern monuments, belonging to the predecessors of Lord Gage; these have now been replaced in a less disfiguring position.

The foundations of the old walls and piers consisted of loose stones tumbled in at random, without being in any way placed in position. Nearly all of the thirteenth-century stone was selected from a good and durable bed, whether red or grey, but that used in the later work had perished wonderfully. It had become pulverised and honey-combed, and it required very considerable renewal. The old chimneys have been rebuilt in stone for the warming apparatus; the one over the chancel window being carried, instead, over the Gage aisle, and its place supplied with a gable cross. The whole of the roofs have been covered again with Forest stone slate. This then finishes the structural portion of the work. We turn now to the fittings.

The whole of the interior has been fitted with open benches. Those in the aisles have been made removable by folding up, so as to leave the magnificently spacious area as free as possible when not required for actual use. To this end, again, the floors of the seats are laid with wood blocks level with the pavement. The font has been placed near the south entrance, in a good open space purposely left for it. The chancel has been chorally arranged, with open stalls and simple carved ends and elbows. A gabled lectern is placed in the nave for the Lessons. During my first visit to the church I discovered the table of the ancient high altar; it was laid down as a pavement slab. There were objections to its being re-used for its original purpose, but I had it placed as a base to the new altar. It is of remarkable length, being 9 feet 3 inches long and 2 feet 3 inches wide,—exactly the same geometrical proportion as is found in the length and breadth of several early churches, and of many early lancet windows, measuring from sill to spring. It was thought that this would be far too long for proper effect, but the new one framed after the old proportion is now acknowledged to be just suited to its position in so large a church. The pulpit has been made out of remains of the old oak from the roofs, of which nothing was then left but fire-wood.

Of the monuments of the church I have not much to say. There were several effigies in stone, which had been displaced from their original positions. These have now been protected and set, one in the Gage aisle, and another at the west end of the south aisle. In the Gage aisle also is a remarkable memorial consisting of a triple cross inlaid in white thin marble, flat, into a Purbeck slab. There were also some fragments of brasses. These had been originally coloured and gilt, and I came upon a boy just in time to save them from being cleaned and polished, but not in time to preserve their first condition. There are also several early memorials in the churchyard, where is also the base of a churchyard cross of massive proportions. The principal memorial, however, is that one of Sir John Joce or Joyce and his wife already referred to. This consists of two stone effigies of the departed, upon a panelled altar tomb; the panels of the tomb are traceried and canopied. The work was delicately but boldly cut in Caen stone; the crockets and fynials were carved with spirit, but the greater portion had perished and dropped to pieces through damp. I rejoiced, however, to find that, from being covered up and protected by the jamb of the arch against which it stood, several of the panels were in perfect order for re-instatement, and they were such as to show the spirit and character of the work for the reproduction of the remainder. They were clean, bright and fresh as they came from the workman's hands. I had had it scrupulously and carefully removed for protection and restoration, and money was being raised to replace it. When I visited the Church some months after completion, I found that this had been committed to a stonecutter, who actually recut the surface of the effigies, to give them a freshness of finish, adding fingers and noses to the somewhat mutilated forms, leaving, indeed, the general form and outline as before, but scarce a particle of the original spirit. He also not only renewed the whole panelling of the tomb, but, so far as I could discover, made off with the old, excepting one poor fragment which he did not consider worth carriage, but from which I have taken the accompanying section, to contrast with the new section. The one is richly and cleanly undercut, the other is shallow and finished in a rough slovenly way,—perhaps in consequence of my former remonstrances as to the pillars, caps and bases of the nave. I trust that this fragment is now and will be henceforth religiously preserved by the side of the new work, if it is too imperfect to be still inserted in one of the new panels.

Such then is the report that I promised of what I might be able to lay before you as to the history of Newland Church, its architecture and its restoration; and I cordially agree with what has several times been urged in this room, that the particulars of all church restoration should be placed upon record, not only as a means of showing, for future reference, what is original and what is not, but also as bringing before those who are competent to deal with the question the difficulties and the treatment, whether right or wrong, that has been adopted; that so, by the comparing of notes, and the mutual interchange of the results of observation, experience and perception, we may learn more and more faithfully to discern and to preserve that which is good and valuable, and to adopt that method which shall best secure the great ends which we have at heart.

It is interesting to observe sometimes the different feelings with which church restoration is undertaken. Whilst one will consider it a pleasant work, another will look upon it as next door to an irksome duty. One delights in the very restraints imposed by the old forms, and another disregards and despises these forms, and feels his own freedom from restraint necessary to the full exercise of his powers. Although, happily, the number is rapidly increasing, there are as yet far too few who are thoroughly and duly impressed with a sense of the responsibility which the touching of old work involves. There may be considerable appreciation of the old work, and interest in being brought into contact with it, and yet there may be wanting a sufficient fear of injuring it by irreverent treatment. The restoration of an ancient church, such as that of which I have given a description, may be called the pleasantest and most interesting work which falls to our lot; but, on the other hand, it is in some respects the most painful, as it is also the most difficult and responsible. Very remunerative, in one sense, it cannot be called, to those who devote themselves heartily to the work; and yet, in a widely different sense, it may well be called one of the most profitable of employments, to such as are capable of receiving any impress from the spirit of those who erected these monuments of piety and art. But it is also one of the pleasantest of occupations. The whole building is full of interest from the bottom to the top, from one end to the other. The noble outline both within and without, the *harmonious* proportion and character;—I say harmonious still, for though various in age and style yet the same spirit pervades the whole of the ancient fabric; and the same general principles of design form a connecting link between the earlier and the later portions, to whatever extent they may have been developed, or howsoever widely they may differ in detail;—the air of repose which it breathes; the hallowed associations which it calls up and transmits from one generation to another, and which, indeed, have supplied much of the patriotic and ancestral love of his old institutions, so deeply rooted in the heart of the true Englishman: all these things, I say, impart a pleasure not to be found in other works. It is a pleasure to know for certain that with a moderate amount of care and self-restraint an effect of repose and harmony can be secured, which is so often wanting in new work. But besides this there is a pleasure in the disappearance of the sad signs of past neglect, and of past selfishness, and the re-appearance of somewhat, at least, of pristine beauty, spaciousness, and order, in the removal of incongruous and obtrusive fittings; as also in witnessing amongst the parishioners the revival of interest in, and the hearty appreciation of, that which was good in the ancient building, but had scarcely been discerned, or even discernible, by any but those whose eyes and hearts have been educated to see beneath the surface the overlaid and mutilated forms which truly still remained. And, above all, it is a pleasure to restore to its full meaning and dignity the ritual arrangement of the English Church, which, until within our remembrance, had been almost utterly lost sight of. Since the time of the spoliation of our churches, by the fanatics who, not content with the reformation of abuses and the eradication of error, sought also to eliminate from the church every mark of external reverence and order, and to set up oral preaching, as antagonistic to, instead of in unison with, preaching by the sacraments, nearly all ritual had been lightly regarded. And the churches having been despoiled, and their furniture, the accumulations of the wealth of centuries, destroyed, at a time of the subversion of the whole state, but little means remained for their reinstatement. The unsettled state of affairs, moreover, was not conducive to people's taking much interest in doing what could be done. Besides, the absurd "*quid prô quo*" argument which has subsequently arisen with respect to the personal and family *occupation* of the chancel by the impropriating lay rector, in consideration of his keeping it in repair, has had a most pernicious effect in the revival of church arrangement. That his obligation to the repair of it is in consideration solely of his receiving the emoluments, has been for a century or more all but ignored; and his tenure of it in trust for the ministers and clerks leading the services of the church, as is shewn by the evidence of existing documents, as well as by legal decision, to be the only true tenure, has been regarded as inconsistent with the fact of impropriation. Thus, through successive neglect and long-established custom, the fabric, as well as endowment, has been too often subjected to an impropriation never contemplated either by the letter or the spirit of the law, or by the original intent of the bad bargains made previously to and at the Reformation. How far it is right or wrong for a pastor or a parish to insist upon right arrangement, and the proper use of a chancel, in the face of an opposing impropriator holding fast by what he deems his prescriptive rights, is a question which is sometimes forced upon us, and in which we may often exercise a good or evil influence. Surely, in any part which we may have to take, we can but aim at the highest standard, and manfully fight for the Church's rights; only taking care in thus contending for an important principle, lest we be tempted to sacrifice a yet higher principle by a lack of Christian chivalry or by a breach of charity. And let us beware of rashness in defending the church's cause, lest we bring down upon her the consequences of personal failure; yet it is necessary to insist most strongly upon this arrangement; for the general effect, and the church-like appearance of the building, depend so entirely upon its being properly arranged in these respects. The gradients leading up to the central point of interest, and the raised position of the antiphonal stalls, leaving a broad and dignified access to that centre, contribute more than is commonly supposed to that effect.

There are some who consider a church constructed like Newland Church, with spacious chancel aisles, unfitted for congregational purposes, on account of some of the congregation not being in front of the pulpit. I do, however, unhesitatingly say, that for a *large* church it is a good arrangement. It is better to have a few of the congregation somewhat behind the preacher, than placed at so great a distance westwards as the extension of the church to receive them would involve. It is better to open the aisles to the chancel than to have them entirely blocked by a wall. Moreover, it contributes to the architectural effect of the interior, by allowing great play of light and shade, and to its perspective by a grouping of arch and pier, which is not so well attained by other means. I urge this the more strongly now, because some have lately abused it in existing buildings as being unmanageable, rather than effective, and have regarded its re-production in new churches merely as a puerile imitation of a form of building adapted only to the many-chapelled plan of the old churches. But it is in this respect, amongst others, that the interior of Newland Church is so wonderfully effective; and it certainly is a pleasure to watch the revival of such effectiveness, by the removal of the huge erections which had, as in this instance, encumbered it.

This, then, is the pleasant side of the picture. But it has also, as I said, its painful side. It is not all so bright as at first appears. One has to lament the loss of many of the best features; some through damp and decay, others through wanton mutilation, and still more, perhaps, through reckless alteration; some through ignorant but pains-taking attempts at renovation. One has to deplore the loss or destruction of the character, and even of the remains, of ancient detail, by workmen charged, again and again, not to touch them. Workmen cannot comprehend the value of a grey surface; or of an ancient moulding-profile left intact; or of that absence of precision which at times imparts a pleasing tone to the general effect. But, even with most careful restoration in work that is much decayed, as in the case of the east window before referred to, we have to deplore the necessary renewal of vestiges which cannot be replaced, and which, if merely re-produced, would have neither value nor interest. Imitation of old work may be tolerably faithful, but it is *not* old work, and it cannot be referred to as such; it is like the lifeless body; the spirit has taken its flight, and has left but the vague semblance of what it once was. And if haply any life-like spirit *is* infused into the re-production, it is not the spirit of the old, but the spirit of a new life; and whether worse or better than the original, it bears the impress of the mind, not of the ancient architect, or of the ancient mason, but of the modern. Again, the difficulties attendant upon faithful restoration are very great. Strong conservatism is, of course, the only true principle, and the only safe guide. A scrupulous regard for all that has gone before, in order that it may be handed down as intact as possible to future generations, is the only spirit in which we may dare to approach our ancestral heritage. But herein oftentimes consists one of the greatest of the difficulties with which we have to contend. It is often needful to sacrifice some portion, in order to a safe and permanent restoration of the remainder. To determine exactly what those portions ought to be—what to be retained or restored—what to be renewed or re-produced—is often an anxious and difficult task. One ready way of surmounting the difficulty appears to be —to have no care for what has gone before, to disregard Mediæval remains, or to regard them only in the light of mere antiquarian lore, all very good in their way if they do not interfere with modern requirements and use. But the responsibility of removing ancient landmarks, or of breaking a single link in the history of our art, is not so easily to be overcome. Whether we are conscious of its burden or no, the weight of responsibility still rests upon our shoulders, and the responsibility is one not merely of a "let alone" nature, as some appear to take for granted, but of active deliberation as to what is best to be done. For instance, to leave work in its old state, with the certainty that in a very few years it must come to renewal, and then at great disadvantage; and that in the interim a more substantial portion of the fabric must assuredly and irremediably suffer to its final detriment rather than preservation; to leave work, I say, in this state, may show greater soundness of motive and feeling, than of judgment and discretion. The doctrine of "do something" is sometimes shrunk from and repudiated as though it opened the door to needless and reckless renovation. But I maintain, that the determination to look upon a question only from its safest side, and in its most favourable light, is not the way to lead to the most successful results. We must look at all sides of a question; without this, an unguarded advocacy of ultra-conservatism may, through its obvious indefensibility, lead to the very evils which it seeks to avoid, and which it must be the earnest endeavour of all to escape from. For the principle of strict and conscientious conservatism is the only basis upon which to build any theory of Church restoration. But a further question forces itself upon our attention, and it must not be set aside as though it were a very plain and simple matter, upon which no doubt could exist, as has been many a time intimated. This question is, as to the mode of renovation of works, necessarily removed or decayed. How far an exact re-production of what was supposed to be the original, or to be the original with several subsequent alterations; or how far the earlier or the later, the better or the worse, should be followed, when the marks of the one, or of the other, are more or less evident: or, once more, to what extent necessary alterations of, or additions to, a building, should follow this or that portion of the original fabric; how far the style of either part should suggest the treatment, or how far it is safer to treat them distinctively, in order rather to show what really is old, and thus to distinguish it from the new—this also opens a wide range of questions which involve difficulty and responsibility, and which are scarcely capable of definite or comprehensive rule. However, generally speaking, whilst on the one hand new work, whether in additions or in insertions which are essentially new, may be carried out with distinctness enough to prevent the confusion of the old work with the new, so on the other hand all traces of old work ought, if possible, to be re-inserted carefully, and exactly in their original position, where necessarily removed, for the benefit of those who may come after; for we have no right to deprive them of the benefits that we may have derived from the remains of ancient work, which will still tell their own story to posterity, in a manner far superior to any that we can urge, and with a vividness and impressiveness not to be equalled by any power of verbal description.

I am exceedingly sorry to find, that with every good intention of conciseness and brevity, I have already exceeded my due limits, without touching upon the equally, if not yet more, important matter of church arrangement. This must stand over for a future time; for as I said at first starting, I shall not now rest till I have laid before this Institute my views thereupon. Should there be no opportunity for my doing so this Session, or even next, I shall yet pertinaciously look forward for the opportunity of urging my plea, on behalf of that which I believe to be the first and most essential of all the elements of Church Architecture.

Mr. J. W. Papworth, Fellow, was quite sure no one would think that the pertinacity self-attributed by Mr. White should be considered blameable, inasmuch as it had produced the promise he had made of a paper stating the views that he held upon the arrangement of churches; and whenever they might be put forth, with the fertility of language and the moderation of sentiments evinced in the present paper, the Institute would surely be happy to hear those views, to discuss them, and to learn from them as much as possible. As Mr. White stated that in the tower of this church a belfry stage had been made "for the purpose of saving the ringers pulling a long rope," he (Mr. Papworth) would be glad to know if Mr. White knew this to be the case, or whether it was merely a suggestion of his own?

Mr. J. P. Seddon, Hon. Sec. said he believed it was generally considered desirable to shorten the length of rope by the insertion of a belfry stage, and that ringers preferred it to ringing below. He himself had in his own practice met with a similar case, in which the bell-ringers expressed a preference for a belfry stage rather than ringing from the lower floor.

Mr. Papworth believed it was the wish of bell-ringers not to be looked at by other people; and if they could not get a belfry stage 30 ft. up, they would be content with 8 ft. or 9 ft.

Mr. White said that might have been the case if there had been a western door, which there was not.

The Chairman said in two instances he had seen this year great erections of wood and iron made to serve as guides for the ropes, it being found impossible to ring with the great length of rope from the bells to the floor. He had generally found that bell-ringers did not like a greater length of rope to pull than 20 ft.

Mr. PAPWORTH, 20 or 25 ft. is not too long a pull, that is to say 30 ft. from the top of the wheel to the floor of the bell ringers' stage.

Mr. WHITE said this ringers' stage at Newland, though 8 or 9 ft. from the ground floor, was still 25 ft. from the floor which formed the first *guide* for the ropes, and some 50 ft. from the top of the wheels; he did not mean that ringers must be so near to the bells as 25 ft.

Mr. PAPWORTH, referring to the fact stated in the paper that the whole of the pavement in the interior of this church had been laid with an inclination towards the north, suggested that it had been done with a view of the water draining off the pavement after being washed down. In some of the Continental cathedrals there was a decided slope of the floor to the west doors; and in English churches most carefully built the same description of slope was to be observed.

The CHAIRMAN thought the difference in the level of the ground had more to do with it than the washing. At Scarborough church the north aisle was considerably above the level of the south aisle.

Mr. PAPWORTH, referring to the statement in the paper that the walls of the tower were of large ashlar, asked whether it was meant that the whole thickness of these walls was so constructed.

Mr. WHITE explained that he only referred to the exterior and had no opportunity of examining the interior of the work.

Mr. PAPWORTH wished to inquire whether in the case under consideration the rood screen was considered to belong to the chancel?

The CHAIRMAN said the rood screen was generally connected with the chancel arch, and the chancel arch belonged to the nave undoubtedly.

Mr. PAPWORTH agreed; but said the point he put was whether the rood screen belonged to the chancel arch, or whether as furniture it did not belong to the chancel.

Mr. SEDDON remarked that the rood screen was sometimes more in the nave than in the chancel.

Mr. PAPWORTH noticed that Mr. Seddon's observation added to the difficulty of deciding to which part of the church the rood or other screen belonged.

The CHAIRMAN said they must be guided in that by what they found in the particular construction of the building.

Mr. PAPWORTH said in a case in which he was consulted the rood screen stood across the whole church, without any other constructional division between the nave and chancel, and the architects engaged respectively to repair the two portions had great difficulty to decide to which portion the rood screen belonged.

The CHAIRMAN admitted it was a very nice question. The chancel arch undoubtedly belonged to the nave.

Mr. SEDDON remarked that generally speaking the approach to the rood screen was from steps in the nave, the rood screen itself was under the centre of the arch, and the greater part of the loft was in the nave, and he should thence conclude that it belonged to the nave.

Mr. PAPWORTH said he was not himself aware of a case of the kind that had been argued and judicially decided.

The CHAIRMAN added that he was not aware of any such case, and he had had difficulty in determining the question himself.

Mr. WHITE said it was the less important, because practically they could not enforce such a thing.

Mr. PAPWORTH, the impropriator might say "If the rood screen is mine I will remove or destroy it," but the parishioners might say "No," as happened in the case he had mentioned; although usually the wish for its destruction was expressed by the parishioners and the opposition had to come from the person who had to repair the chancel.

Mr. WHITE remarked that the impropriator had no right to destroy it.

Mr. PAPWORTH had heard with great satisfaction the observations by which the author of the paper had shown that frequently in such a restoration, the duty of the architect to study the future as well as the present pecuniary interests of his clients, would lead to a satisfactory solution of questions that might arise as to how much should be repaired, and how much should be new. He also cordially sympathised with the author's views as to the necessity for leaving visible and distinct and untouched the original fragments of repaired or rebuilt work; so that the apparent evidence of details more or less curious might not be so much mistrusted by the future student in England, as would be the case on the continent, especially in France. He begged, therefore, to close his remarks by moving formally the usual vote of thanks for the paper to Mr. White.

Mr. SEDDON said as no time was left for the discussion of this paper, he would, in seconding the vote of thanks, just state that he had visited this church both before and after its restoration. He could testify to the deplorable state in which it was on his first visit, and also to the greatly improved condition in which it now was. It was now a most interesting and noble church, worthy of the distinction it possessed as being the mother church of the Forest of Dean, and he gladly seconded the motion made by Mr. Papworth.

The CHAIRMAN was quite sure they would all agree with the proposer and seconder of the motion, that their best thanks were due to Mr. White for his paper, and that they would be glad to welcome him again, to hear his further opinions on the subject of church arrangement.

The meeting then adjourned.

A FEW WORDS IN FAVOUR OF THE DECIMAL BUT AGAINST THE METRICAL SYSTEM OF MEASUREMENT; AND AN ENDEAVOUR TO SHOW HOW ALL THE ADVANTAGES OF THE METRICAL SYSTEM MAY BE OBTAINED WITHOUT GIVING UP THE ENGLISH STANDARDS.

By F. C. Penrose, M.A., Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, November 30, 1863.

It will be, no doubt, remembered, that a bill was introduced last session into parliament for altering our weights and measures by the adoption of the Metrical system, of which the *second reading* was carried, but owing to the press of other business it did not proceed further. Mr. Ewart however, the proposer of the bill, signified his intention of re-introducing it, and as the legislature, by allowing the second reading of the bill seem to have adopted *the principle* of the measure, it becomes to us one of very great and practical importance, and one which the Institute is bound fully to consider. One step has already very properly been taken by our Council in petitioning Parliament in a general way for the adoption of the Metrical system: doubtless under the impression that this system offered the only hope of escape from our present anomalous methods, and the only practicable way of obtaining the advantage of decimal computation. If this indeed seemed to be the case, I should not now ask you to re-consider the question: but if, as I venture to hope, I shall be able to point out a plan which will secure almost all the advantages which are looked for, and avoid a very great part of the inconveniences which would inevitably attend an alteration of the standard by which we have been accustomed to work; it will be for you to consider whether a petition going more fully into the question may not be addressed to the legislature, who will no doubt be willing to give it the consideration they have invariably shown to this Institute.

There may be doubtless a difference of opinion as to whether any change whatever is desirable:—that is, however, much too wide a question to be discussed in a short paper, and I must beg to be understood in what follows, not so much to be advocating change, as to be taking it for granted, that we *stand committed to some change*, and to be pleading for the improvement of the system to which we are accustomed, rather than the adoption of the French metre, which would entail very great difficulty upon the class of artizans even more than on ourselves, and which, although it promises ultimate advantages, would be attended with serious drawbacks.

The objects to be obtained are:—

(1) Uniformity of system.

(2) Decimal computation.

(3) Agreement with the French standard, which has obtained a great hold on the Continent of Europe.

I should refer to the evidence taken before Mr. Ewart's Committee for arguments in favour of uniformity of system, if it were not that we meet with too many annoyances in our own practice to render such arguments necessary. What with strikes, chaldrons, sacks, hods, loads, bags, &c., perches of various lengths, ropes, cords, chains, ells, nails, hands, &c., and in weights, the septenary scale, pounds troy, apothecaries, and avoirdupois, and several varieties of stones, we must often wish for a more uniform system, such for instance, as would be attained if every measure of capacity were reckoned in gallons, every measure of length in feet, and every weight in pounds avoirdupois, and of course such other terms as are necessary to express the multiples and sub-multiples of these standards in the simplest possible form, or any other uniform and general system.

It may also be asserted that any thing which is found troublesome to beginners, requires more effort even to adepts than what was obvious from the first. It may not amount to much in a single instance, but it *does* ultimately tell. I will instance the unnecessary confusion introduced by measuring land by the chain, rod, yards, &c., and superficial extent in most other things, in feet. We use indeed the land measure for our rod of reduced brickwork, but is it not evident that the square of 100 feet by which we measure the areas of roofs and floors, &c., is an idea more immediately grasped in the mind, and in fact gives less trouble in computation?

One is led to remark in passing, that it seems strange that we have not rejected a number so troublesome to deal with as 272, and which after all is not the correct square of 16 ft. 6 in. for the simpler number.

It can hardly be necessary to say any more in favour of uniformity; and for any further argument I must refer to the Blue Book.

In what follows, I must confine my remarks to the question of mensuration, leaving coinage, weight, and capacity alone; not that there is more difficulty connected with these questions, and I grant that in a full consideration of the subject they cannot be disunited, but because mensuration is a subject which belongs to us in a peculiar manner, we may, I think, consider it by itself.* I will, therefore, briefly consider the relative merits of decimal and duodecimal computation as applied to measurement, and which no doubt admits of argument on both sides, and premise that after the full consideration, which I hope will be given to this question, should you be strongly of opinion that the advantages lie in favour of the duodecimal scale, it would be, I apprehend, the duty of the Institute to petition Parliament, not to sanction any alteration in the direction of decimal systems; but I cannot but think that an opposite conclusion will be arrived at, and I believe that few, if any, who have fairly tried the decimal system and know its power, will feel much hesitation on the subject.

It is confidently asserted by Mr. Ewart's Committee that none of the nations who have adopted the Metrical system have had any desire to give it up. This I fully believe, but obviously owing to its decimal form, and not to the peculiar standard called the metre. Let us for a moment leave out of our consideration our English methods. Most of us are familiar with the decimal coinage of France, Switzerland, and Italy, and with the divisions by thirty and sixty which prevail in the coins of Germany, and which is essentially the same as the duodecimal system. Can we doubt for one moment which of the two is preferable, and which entails the least trouble on travellers.

In favour of the duodecimal scale it is urged that as 3 is a lower number than 5, more numbers can be divided by an unit with 12 sub-divisions, than by an unit with 10 sub-divisions. This advantage cannot be altogether denied, but it is mainly confined to integer numbers. For instance, let 241 feet be divided by 3, we obtain in the one case 80 ft. 4 in., or in the decimal scale 80·$\overline{3}$ ft. (the bar over the 3 expresses the recurring decimal 3333, &c.) As a case of fractional quantity let us take 241 ft. 8 in.; this divided by 3 gives in one case 80 ft. 6 in., $\frac{2}{3}$, in the other 80.$\overline{5}$, which is obtained with quite as much ease and is as readily and correctly found on the rule. Suppose now the advocate of the decimal system to retaliate and ask his opponent to divide 241 ft. by 5. The answer 48 ft. 2 in., $\frac{2}{5}$, may be compared with 48·2 ft., where the advantage evidently belongs to the decimal scale.

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* I will merely observe that it would be easy to conciliate our measures of weight and capacity with the Metrical system, in a manner nearly analogous to that which is suggested further on for the measure of length, by making a very minute change in our own standards.

For 10 kilogrammes = 22·06 lbs., and 100 litres = 22·01 gallons.

It will be obvious that an alteration, which would be practically inappreciable in our weights and measures, would render them readily convertible into the Metrical system. An objection has been, I think, very properly made against the use of the decimal system in the lowest denomination of coinage, weights, and measures of capacity, but which does not apply to measures of length. This may be easily met by keeping the lowest denominations on the binary scale as we have it at present. There is strong reason for believing that farthings are more convenient in use than centimes, and quarter ounces than five gramme weights, and for purposes of calculation the binary scale may at once be translated into the decimal.

Again, as it is easier to divide by the eye a small residuary quantity by 3, than to divide it by 5, it is evident the duodecimal rule aids us where we require it less, and the decimal where we require it more. It is therefore doubtful even in this limited part of the question (and which is the one strong point of the duodecimal claim) whether the case is made out in favour of the duodecimal.

Then the notation of the decimal scale is simpler and less liable to error, the only accent we have to consider being the decimal point—and even when this, by accident, is erased or misplaced, the nature of the case will generally supply the correction. It is not so in the duodecimal scale, you are greatly dependent on the accents for the avoidance of mistakes, and have not the same means of settling a doubt between such figures as 11 in. and 1 ft. 1 in., supposing the accents illegible or otherwise at fault, as you have between 1·1 ft. and 11· ft. for instance. The continuity of method also gives rapidity and accuracy in taking dimensions. Instead of balancing, which is the nearest inch, quarter, or sixteenth of an inch to write down, we can quote without hesitation the absolute value to the tenth, hundredth or thousandth of a foot, according to the amount of accuracy demanded. Again, for almost all nice calculations founded upon dimensions taken in feet and inches, you must convert them into decimals—as, for instance, to obtain the assistance of logarithms, or that most useful application of logarithms, the engineer's slide rule: and lastly it is only through a decimal scale that we can associate our standard to the Metrical system. I can hardly believe then that the Institute will recommend a retrograde course, and I will presume that we approve of the action of the Council, so far as uniformity and decimal computation are concerned. Our next consideration will be the method by which these advantages are to be obtained.

It must, I think, be obvious that we should obtain important advantages if our standard agreed with the French metre: commercially I presume very great:* to us, as architects, and for other scientific purposes considerable; and these considerations added to the fact, that an uniform and decimal system is there already existing, led to the proposal for the adoption of the Metrical system, and its acceptance in principle by Parliament.

The objections to the metre appear to me, however, so great that I cannot but think that two other courses are preferable, one which has received much consideration, namely, the adoption of the decimal foot, and another which I wish to bring before your notice.

I will first consider the metre in reference to the English decimal foot.

Prof. de Morgan in his evidence before Mr. Ewart's Committee stated his opinion that he considered the metre as too large a standard for ordinary use; and a writer in the Times, a few days after the parliamentary division referred to, stated that he had had much experience in France as a surveyor, and that he found that measurements taken in metres required more figures and consequently more labour than similar operations in feet and inches. We may, I think, readily see how this might be the case.

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* Although the metre has obtained great acceptance on the continent of Europe, it is not, however, universally adopted. I believe that Russia uses the English foot to a greater extent than the metre, and North America and our own colonies are also to be considered.

For most purposes in measure and value work it is not necessary to consider fractions of inches, and the feet in a very large number of cases do not run into numbers higher than 10. Take for example, a block of stone which measures approximately 3 ft. 9 in. × 10 in. × 7 in.; the cube of which by duodecimals is $1\,,\,9'\,,\,10''\,,\,6'''$.* The nearest expression in feet and tenths would be $3{\cdot}7 \times {\cdot}8 \times {\cdot}6$, of which the cube is 1·776. As $1\,,\,9'$ duodecimal, is equivalent to 1·75 decimal, it may easily be seen how small a difference would arise from using roughly the decimal foot. But with the metre if we go no further than decimetres we should have $1{\cdot}1 \times {\cdot}3 \times {\cdot}2 = {\cdot}066$ cubic metres, equal to 2·333 cubic feet. It is evident therefore that the decimetre would not suffice even for rough measurement, and it would be generally necessary to consider the centimetres also, which, from necessitating the use of more figures in squaring and cubing, &c. would neutralize much of the advantage of the decimal system. I have, of course, been speaking of ordinary measurement for the purpose of valuation, where a little judgment is exercised in give and take to save labour in calculation, and what I have said does not apply to the measurement of large things, but the chief labour is in the multiplicity of small items.

In adopting the metre we should have to revolutionize our ideas of reckoning, for although accustomed to the use of inches we might without much trouble translate a measurement in inches into decimals —for instance, 9 in. is easily perceived to be 75 per cent. of a foot, but it is very different to conceive an equally clear notion of it as 23 per cent. of something rather longer than a yard. For the above reasons I must think the metre decidedly less desirable than the decimal foot. The objections to the decimal foot, however, are that it would not give us much assistance in comparing our measurements with the metrical system; and that when the importance of small measurements which have been established in inches is considered the inch is not lightly to be given up. Is it possible to reconcile all these difficulties? I think it is, and have now to bring before your notice a decimal system which, unless I deceive myself, would give a sufficient relation with the metre for commercial purposes, and with the minimum of inconvenience to ourselves and some other special advantages in addition.

The metre is 3·2808992 English feet. Originally it was supposed to be one ten-millionth part of the quadrant of the meridian of the globe, but as this was based on an erroneous view of the figure of the earth it has lost the astronomical interest to which it aspired. 3·2808992 ft. is equivalent to 1·0936331 yds., which is not a number very easy of comparison with unity. It is, however, very nearly as 525 : 480, for $\frac{525}{480} = 1{\cdot}0937500$, and $\frac{525}{480} = \frac{100}{96} \times \frac{105}{100}$.

If then the English foot were increased by one twenty-fourth part, the yard of three such feet would have the simple relation to the metre of 100 to 105, with sufficient accuracy for almost all practical purposes. The error would be about one ten-thousandth part, and would not exceed one mile compared with the diameter of the globe.

What would be the result upon our measures of altering our standard to this extent? We should obtain a decimal scale in which the eighth of an inch, absolutely unaltered, would form the element.

The new foot or "span," if for the present I may be allowed so to call it (for the sake of avoiding mistakes between it and the foot) would consist of one hundred eighths of inches. To reckon measurements of length by this new standard would not alter our general notions to any important degree. It would be convertible to or from our present foot by the easy process which will be best seen from the following example:—

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* The common practice of placing one accent ($'$) over the feet, and two ($''$) over the inches, has two inconveniences. It is contrary to the analogy of other measurement—such as of angles.—It also foregoes a great advantage in multiplication by duodecimals. If we place the single accent over the inches, &c., the place of any figure in the product is found at once by adding the accents of the factors.

Let 13·28 spans be proposed to be converted into feet.

$$\begin{array}{rcl} 13^{\text{s.}} & = & 13^{\text{ft.}} + 6\tfrac{1}{2}^{\text{in.}} \\ \cdot 28 & = & + \ 3\tfrac{1}{2}^{\text{in.}} \\ \hline & & 13^{\text{ft.}} \ 10^{\text{ in.}} \\ \hline \end{array}$$

Let 13 ft. 10 in. be proposed to be converted into spans.

$$\begin{array}{rcl} 13^{\text{ft.}} & = & 13^{\text{S.}} - 6\tfrac{1}{2}^{\text{in.}} \\ \cdot 10^{\text{in.}} & = & + \ 10^{\text{ in.}} \\ \hline & & 13^{\text{S.}} + 3\tfrac{1}{2}^{\text{in.}} \\ & = & 13 \quad \cdot 28^{\text{ Spans.}} \end{array}$$

Conversion into the French measure is quite as easy.

Let 435 metres be proposed to be converted into span yards or yards of 3 spans.

$$\begin{array}{rrl} & 435\cdot 0 & \text{Metres} \\ \text{add 5 per cent.} & 21\cdot 75 & \\ \hline & 456\cdot 75 & \text{Span yards} \\ \hline \end{array}$$

Let 456·75 span yards be proposed to be converted into metres.

$$\begin{array}{rrl} & 456\cdot 75 & \text{Span yards} \\ \text{deduct 5 per cent.} & 22\cdot 84 & \\ \hline & 433\cdot 91 & \\ \text{add 5 per cent. of the previous deduction} & 1\cdot 14 & \\ \hline & 435\cdot 05 & \text{Metres} \\ \hline \end{array}$$

To return to the advantages of this system for home use. It would not be necessary to reconsider our national standards upon which so much labour has been bestowed: for the span and foot are immediately convertible as shown above. Moreover, it would have even a more perfect analogy with the measurement of the globe than the metre is found to possess. If we make 5000 spans our mile, which would differ from the present mile by less than 24 yards, it would be exactly six-sevenths of the nautical mile. The correspondence of seventy such miles, with a degree of the meridian measured in latitude 45° is very remarkable. It is stated in Herschell's Outlines of Astronomy, Article 216, that a degree of the meridian measured in latitude 44° 51′ was found to be 364572 English feet; and seventy *span miles*, or miles of 5000 spans, reduced to feet gives 364583. Two hundred spans would form the side of a square acre, differing less than one perch from our present acre, giving, of course, 40,000 square spans to the acre and 10,000 to the rood. The square mile would contain 625 acres, or 16 square miles would contain 10,000 acres, and a piece of land of the breadth of one square acre (*i.e.* 200 spans) and a mile long would contain 25 acres; it would therefore no longer be necessary to use one measure for land and another for other purposes.

It will be observed that the proposed scheme retains the service of the inch, so that whatever small measurements we are familiar with (and this is of immense importance to artisans in every trade) are at once found on the rule. Our familiar half brick of 4½ inches for instance, is obviously 36 cents. The measurements of delicate objects, for which hitherto decimals of the inch have been used, are converted by multiplying by 8. I am inclined to think that this advantage, independently of the considerations of the simplification of the mile and the acre given above, and the simple relation to the French metre, would alone suffice to claim for the *span* (or whatever we should feel disposed to call this measure) a preference to the decimal foot, and in every respect a preference to the metre.

ON THE PARIS STREET IMPROVEMENTS, AND THEIR COST.

By W. Tite, M.P., F.R.S.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, December 14, 1863.

The improvements that have lately been effected in the streets of Paris are of so very extraordinary a character, and they have given rise to the promulgation of such singular opinions as to their results, that I have been induced to look into the question somewhat closely. I have always held that the making of a new street, in the heart of a city, was an operation that must be attended with a positive loss to the body undertaking it; in some cases amounting to as much as 60 per cent. of the capital employed in it; and I was therefore anxious to discover, if possible the result of our French neighbours' experience in the matter. It is said that they "manage these things better in France, than with ourselves;" and that, in the Rue de Rivoli, for instance, the works of street improvement had been accomplished with profit; it became then a matter of interest to endeavour to discover the facts of the case, and I therefore took measures to ascertain the cost of the new streets from the official Reports. My examination has led to a confirmation of my opinion, and to the belief that the improvements of Paris have cost at least the proportion that I have named; and instead of having yielded a profit, the recent alterations have in all cases proved to be a source of very considerable loss.

The great operations in Paris began in the year 1848, by the works which have been undertaken for the purpose of continuing the Palace of the Tuileries, to the Louvre; which was subsequently extended to the disengagement of the Hôtel de Ville, and the continuation of the Rue de Rivoli, to the prolongation of the Rue St. Antoine. This was a very necessary improvement; for the streets which were demolished had, in 1848, been the stronghold of the insurrections that marked the year; and they were so close to the public buildings named, that the latter were always in danger of being seized by the mob, when there was any disturbance. In addition to this strategetical motive, there was the consideration that Paris wanted ventilation in this direction, and that the communications from the east to the west would be immeasureably benefited by the new street; but if this circumstance gave the promise that the benefit of the operation would be great, it also entailed upon the City several necessities, which I shall have occasion to revert to hereafter. In the meantime, the movement was given to pulling down of houses, and rebuilding them in a more magnificent style: the Boulevard Sebastopol was undertaken, the Halles Centrales were begun; the Boulevards St. Germain, de Prince Eugène, des Écoles, de Malesherbes, &c., were in turn commenced; the Rue de Rouen, the opening of the new quarter de l'Opera, the remodification of the Chaussée d'Antin and the Rue Basse du Rempart, the prolongation of the Boulevard from the Opera to the Theatre Français, &c.: were all decided upon, and in due time they were also commenced. The State intervened in the various cases, with a subvention that varied in amount from one half to one third of the cost; and it has always proved itself anxious to contribute to the embellishments of the City. It has from time to time authorized the town to contract loans to the amount of 180,000,000 francs up to the close of the financial year 1861; and has facilitated this employment of public credit in every way that it could; it even would appear from the statement by the Prefect that it had paid, upon the operations then ascertained to have been effected, the total sum of 40,500,000 francs. There was no occasion, however, for the strict account being made up between the City and the State; for the works of the Bois de Boulogne, the Parc de Monceaux and the Bois de Vincennes, had also to be included in the sums that the Crown would have eventually to give credit for; the proceeds of the sale of the waste land, and of the building materials, also were added to the resources which the authorities of Paris could dispose of in the mean time. The works of demolition and re-construction, therefore, have proceeded with a vigour that has passed belief, and the city of Paris has been changed with a rapidity that we, Englishmen, can have no conception of.

There is indeed something that is very remarkable in the steps by which Paris has been brought to its present state, and they do, indeed, savour strongly of magic. The broad straight boulevards, the numerous places and squares provided from distance to distance for the comfort and recreation of the people, the various places formed for their promenade in the Bois de Boulogne, the Parc de Monceaux, and the Bois de Vincennes—all testify in the highest manner to the anxious care with which the Administration provides for the wants of those committed to its charge. In the Prefect's Report, there also appear the accounts of the city of Paris for the repairing, and the decoration of the churches, and the public buildings, that fall to the care of the Municipality; and they are, it must be confessed, maintained in a better state than similar buildings are by the English authorities. But the question arises, in spite of ourselves—how is all this outlay to be met? M. Ferdinand de Lasteyrie said, in 1861, that the City of Paris had incurred liabilities, by the decision of the Juries, to the extent of 321,000,000 francs; and that the liabilities of the City were far from being limited to that sum. The liabilities seem to go on increasing from year to year; the resources do not seem to increase in the same manner, and though the credit of Paris be good, a too frequent resource to that means of meeting the demands upon it, seems a doubtful course. The reasons why these questions occur so forcibly to my mind are, that I am convinced that every one of the improvements must be a source of outlay to the City, and it cannot go on in this manner adding indefinitely to its obligations; nor can the State continue to augment the public burthens for the sake of the dwellers in Paris. The nature, and extent, of the claims upon Paris for the expense of the improvements will be best judged of by the inspection of the returns; but these it must be observed are but a small part of the obligations of Paris in the matter. Indeed it is hard to discover, in the returns that are submitted to the town council, anything like a clear statement of the cost of any one of these operations; for they spread over so long a time, and they are so complicated in themselves, that it is not easy to arrive at any correct result from their examination. Nevertheless, the results of the operations of the Halles Centrales, the prolongation of the Rue de Rivoli, and the Boulevard Sebastopol on the right bank of the Seine, are already sufficiently known to enable us to reason upon their results with something like certainty.

The Halles Centrales gave rise to an outlay that was in itself purely commercial, and it would be fairer to compare the cost of that operation with the similar one undertaken by the Corporation of London in the removal of the Fleet Market. However, the cost, and the returns, of the Halles Centrales appear in the Prefect's Returns as follows:

HALLES CENTRALES.

Dr.	Francs.	*Cr.*	Francs.
Sale of old materials	389,170.74	Land	19,523,879.78
Sale of spare lands	2,953,516.43	Reconstruction of houses	157,875.00
Divers products	473,731.86	Buildings	11,464,021.11
Properties unsold at 33 years' purchase on 88,080,37 fr.	2,906,652.21	Roads, &c.	535,660.09
		Square of Innocents, and Fountain of Nymphs	114,802.03
	6,723,071.24		
Loss on this operation	25,073,167.37		
	31,796,238.61		31,796,238.01

The returns of the Rue de Rivoli are given somewhat more in detail, because the State has intervened in very different proportions in certain parts of the work; thus the accounts of the creditor side appear to be—

	Francs.	Francs.
1st Operation at the sole expense of the Town from the Place du Louvre to the Hotel de Ville, including the opening for the Square of St. Jacques la Boucherie—		
Purchase of land	36,605,854.73	
Making roadway	1,526,613.15	
Lowering the Bridge of Notre Dame	1,439,886.58	
Restoration of the Tower of St. Jacques la Boucherie	828,883.08	
		40,401,237.54
2nd Operation, at equal cost of the State and the Town—		
Purchase of land	17,316,263.25	
Making of roadway	103,237.55	
		17,419,490.80
3rd Operation at two-thirds of the whole cost on account of the State, one-third at that of the Town—		
Purchase of land	21,686,241.37	
Making of roadways	591,629.39	
Levelling the Place du Carrousel	209,946.56	
		22,487,817.32
4th Operation at the cost of one-third for the State, and two-thirds for the Town—		
Purchase of land	26,833,818.82	
Making roadways	944,886.65	
Construction of two houses at the corner of Avenue Victoria	566,483.53	
Indemnity or damages, 3,500 fr. added to No. 1		
		28,345,189.00
TOTAL		108,653,734.66

The products realized from the sale of the surplus land, &c. were:

For the 1st operation—		
Sale of old materials	1,129,407.13	
,, of surplus lands	5,623,924.67	
,, of divers products	261,898.35	
	7,015,230.15	
Properties unsold, 43,325.80 fr., at 33 years' purchase	1,429,751.40	
		8,444,981.55
For the 2nd Operation—		
Sale of old materials	638,605.00	
Sale of land	3,103,427.30	
Divers products	28.843.29	
	3,770,875.59	
Properties unsold, 56,289,08 fr., at 33 years' purchase	1,857,539.64	
		5,628,415.23
Carry forward		14,073,396.78

	Francs.	Francs.
For the 3rd operation— Brought forward		14,073,396.78
Sale of old materials	511,912.75	
,, of spare land	5,695,287.40	
Divers products	673,934.92	
	6,881,135.07	
Properties unsold, 140,849.40 fr., at 33 years' purchase	4,648,030.20	
		11,529,165.27
For the 4th operation—		
Sale of old materials	907,999.00	
,, of spare land	3,638,479.00	
Divers products	514,569.90	
	5,061,047.90	
Properties unsold, 21,187.60 frs., at 33 years' purchase	669,190.80	
		5,730,238.70
TOTAL		31,332,800.75

Thus the street has cost the total sum of 108,654,000 francs nearly, and it has brought in the sum of 31,332,800 francs; or the total loss upon this operation, supposing it to have been executed at the sole expense of the City, would be about 71.16 per cent.; and it is to be observed, that in order to make the returns as high as possible, I have estimated the whole of the properties unsold *at 33 years' purchase* of the gross rental received from them, without any deduction for the cost of collection, the maintenance in order of the properties, &c. The sum that the State will have to pay will of course depend upon the receipts, after the whole of the property shall have been realized; but if we assume it to be as I have stated, it will be about as follows:

		Francs.
For the 2nd operation	$(17{,}419{,}490.80 - 5{,}628{,}415.23) \div 2 =$	5,895,537.78
,, 3rd ,,	$(22{,}487{,}817.32 - 11{,}529{,}165.27) \div \frac{2}{3} =$	7,305,768.03
,, 4th ,,	$(28{,}345{,}189.00 - 5{,}730{,}238.70) \div \frac{1}{3} =$	7,538,316.76
Total Francs		20,739,622.57
Added to the sum derived as above		31,332,800.75
Making a Total of		52,072,423.32

This would reduce the cost of the Rue de Rivoli to about 48 per cent. of the gross outlay, leaving out of account the interest of the sums paid in the course of the operation.

The reconstruction of the Boulevard Sebastopol has given rise to very nearly the same result; for we find that it has been driven through the densely peopled parts of the town, between the Rues St. Martin and St. Denis, and so on to the Place du Châtelet. There have been reserved great spaces at the Station of the Strasbourg Railway, at the Conservatoire des Arts et Métiers, and at the point of junction with the Place du Châtelet; and throughout the length of the street it has been established of the width that is considered to be necessary for the principal thoroughfares of Paris. This is equivalent to saying that the width is rather exaggerated, and that the aspect of the street is throughout its length, *monumental*. We find its cost to have been as follows:

	Francs.	Francs.
Land purchased, one-third on account of the State and two-thirds on account of the Town	54,323,410.48	
Works of roadways ditto	2,448,951.32	
Buildings	164,947.50	
Rectification of Absis of St. Leu	159,047.00	
Inauguration of Boulevard	70,309.00	
Paid to the Caisse des Travaux	1,500,000.00	
		58,666,665.30
Products—		
Sale of old materials	3,187,923.88	
Re-sale of land	18,061,284.02	
Divers products	1,531,939.66	
	22,781,147.56	
Properties unsold, 33,280.79 fr., on 33 years' purchase	1,098,266.07	
		23,879,413.63
		34,787,251.67

The total would make the town a loser by this particular operation of about 60 per cent.; and as the State supports one-third of the loss on it, the City proportion is about 23,191,500 fr.; or it must content itself with a loss of about 40 per cent. on the gross outlay for the street, whilst shifting the burthen of the extra 20 per cent. on to the general tax payers of the country. The accounts for the other works are not yet made up in detail, for the works upon them are now proceeding; but there seems to be every reason to suspect that they will present similar results to the above; for they have been conducted on precisely the same principles, and the same disregard to economical conditions as the streets already examined.

For instance, in the works undertaken of late upon the line of the Boulevard Malesherbes, the width that was thrown out, on each side of the roadway, was made just the width of one house on each side, beyond that which was required for the road itself. Beyond that point the streets, on both sides, are left at their natural level, and they are sometimes as much as 20 or 30 feet above the surface of the Boulevard, that is supposed to give access to them. There are the same great spaces left for air, and the enjoyment of the open streets, as we have seen to be the case with the Boulevard Sebastopol, and the Rue de Rivoli; and the communications are evidently designed for a great city, and for the capital of the Arts. They have, however, been designed without reference to the wants of the locality, and they must give rise to still greater expense than has yet been incurred, before they can be made to serve the purposes for which they were intended. In the case of the Rue de Rivoli, there might have been some excuse for the levelling of the side streets; for emphatically that was the leading thoroughfare through Paris, and it serves to place in connection with one another the Tuileries, the Louvre and the Hôtel de Ville; and the Caserne Napoleon may also claim to be considered as a part of the plan; but what could have been the motive for placing the streets abutting upon the Boulevard Malesherbes at such a disadvantage, as they now are, must always be a mystery. The same thing may be said of the Boulevard de Sebastopol, on the left bank of the Seine, for the levels of the abutting streets have also in many cases to be greatly altered, and the open Places near the Palais des Thermes, and the Hôtel Cluny, are strangely different from the levels of the great lines of communication. In fact, the principle that seems to have been adopted in designing the works of these Boulevards has been to fix the levels of the two extreme points, and to make the surface of the ground between them on one uniform inclination. This produces great regularity, no doubt, but the sacrifice for the sake of this is enormous; such as, in fact, we can hardly suppose to have been undertaken by a municipality, elected by the general body of the ratepayers,

I alluded in the previous part of this paper to the extraordinary conditions that prevailed in the Rue de Rivoli, that made the operation of driving that street more than usually expensive; and I think the present a good opportunity for recurring to them. In the first place, the houses that were pulled down were densely peopled; they were built in close proximity to one another, like the houses that were in the heart of the city, and in the very centre of business; they were built, of course, upon all the errors of a Mediæval town without regard to hygiène, but with regard to making the most of the surface. The new street was, as was before stated, meant to constitute the main artery of thoroughfare; it was intended to form the line of communication between the various public buildings that it encountered; so that the width of the new street was necessarily very large. There were in its length a number of large open spaces for the disentanglement of the public buildings, such as the Colonnade of the Louvre, the Tower of St. Jacques de la Boucherie, the Hôtel de Ville, and in front of the Palais Royal; all of which were, in so many words, drawbacks upon the success of the operation, by reason of the spaces of ground they rendered it necessary to abandon. More than half the ground on one side of the Rue de Rivoli has thus been ceded to the public; and if the City, with even this sacrifice, has been able to achieve the street, at a gross outlay upon the expense, equal to about 70 per cent. (exactly 71·16) it must be considered to have conducted its operations very skillfully, and very well.

I endeavoured some time since to obtain a return from the House of Commons for the purpose of forming some opinion on the subject of the cost of such works in London, but their replies to my questions were made in the usual style, that is to say they were contained in a mass of figures so grouped that nothing could be extracted from them. All that I have been enabled to derive from them is that the new Cannon Street cost a gross sum of £589,470., or at the rate of £506. per yard forward; the new Victoria Street cost £330,675., or about £300. per yard forward; but I have not been able to ascertain the proportion the City authorities got back upon those sums by the sale of the ground rents. My own experience in these matters is, however, very considerable, and it has led me to the belief that, unless there be some very exceptional cases, the operation of converting inhabited house rent into ground rent—which is the real meaning of the operation of pulling down houses and re-building them on the assumption that they are parts of town improvements—must always result in loss to those undertaking it. When, as in Paris, wide, straight Boulevards are substituted for narrow, confined streets; when there are, moreover, great places provided tor the recreation of the public, it is not all astonishing that the expense is at the rate of 70 per cent. on the outlay. The State has come to the assistance of the City in this matter; but it can only be by casting the burthen upon the tax payers of the country generally—a course which may be tolerated in a highly centralized country, like France, where, in fact, Paris is everything, and the rest of the nation nothing in comparison with it—but which would hardly be tolerated in England, where we pride ourselves on making every place pay for its own improvements.

Before quitting the subject, it may be as well to say that the expenses of the city of Paris are defrayed by a set of receipts that usually figure in the budget presented by the Prefect under the name of "recettes ordinaires," a set called the "recettes extraordinaires," the "recettes supplémentaires," and the "recettes sur fonds speciaux." The recettes ordinaires are made up of the—

	Francs.
Centimes Communeaux	2,693,099.91
Octroi	77,257,065.46
Carried forward	79,950,165.37

	Francs.
Brought forward	79,950,165.37
Escort of Merchandise	81,873.64
Fines (in octroi)	192,015.26
Octroi on Gas	1,267,464.50
Halles et Marchés	4,463,619.07
Location of places in markets	2,163,778.93
Ditto in markets outside Barriéres	402,996.80
Weighing and measuring	740,635.15
Voirie	540,490.15
Water works	3,656,156.10
Abattoirs	2,146,379.25
Entrepôts	417,931.39
Paid for standing room, &c., cabs, stalls	2,655,465.21
Communal properties, rents of	591,314.19
Expeditions d'Actes	126,991.40
Burials and proceeds of cemeteries	1,195,938.00
Exploitation des voiries (working of cesspools, &c.)	501,285.39
Frais d'eclairage, sweeping markets, contributions of proprietors to works of streets, &c. &c., legacies	8,444,547.04
Drivers' receipts (tax on dogs, &c.)	2,702,670.69
	112,241,717.53
Tax upon burials omitted	295,060.55
Extraordinary Receipts of ordinary Budget	112,536,778.08
Extraordinary tax on the territories united to Paris	233,504.48
Produce of sale of property	659,400.76
Ditto of divers property	376,786.72
Contributions and payment of State	6,128,802.87
Total of ordinary Budget	119,935,272.91
Receipts called "extraordinary," "supplementary" and "fonds speciaux"—	
Proceeds of loan	48,825,212.50
Sale of land beyond lines of street	3,858,038.15
Rents of properties unsold	370,863,60
Divers products	12,574.75
Balance of last year's accounts	26,805,241.29
Interest upon funds at bank	
	199,807,203.20

This would appear to show that the ordinary budget of the City of Paris amounted to about 112,500,000 francs a year, or about 4½ millions sterling, for which the town, it must be observed, does much that we leave to be done by private companies or by individuals; as for instance, the Abattoirs, Cemeteries, Water Works, &c. The latter branch of the service is discharged in a most disgraceful manner; though the fountains play in every street, the house service is neglected, and water is bought by the pail. It is not my purpose, however, to enter into a comparison of the systems adopted in the two countries, it would require too long a time, and would lead into far too great discussion, touching as the question does on the whole social relations of the population. It may suffice to say that out of the sum of four millions and a half raised yearly, the city of Paris has to pay the interest on the sums borrowed, and the expenses of watching, lighting, paving, sewering and watering the City; and when we reflect that the revenue is principally made up of personal contributions we may easily conceive that the cost of raising it must be enormous. The interest upon the funded debts of the City, at present, is about 10,546,788.64 fr., or £439,449. nearly, an insignificant sum, perhaps, for the two millions of inhabitants of Paris; but it will begin to tell rapidly upon the productive industry of the locality if it be not watched carefully, and checked in its gradual and steady increase. The credit of the City, as was before said, stands very high, but it will suffice for a few more operations, such as the Boulevard Malesherbes, to compromise it very severely.

I may be allowed to say that the Comptes Généraux presented by the Prefect to the town council are models of public accounts. They are clear and distinct—difficult of course to understand at first, like all such documents; but they contain all the elements for an analysis of the separate accounts, such as I have endeavoured to lay before you. I could not have obtained these documents without the kind co-operation of his Excellency Lord Cowley, who facilitated my enquiries by every means in his power, and to whom I tender my sincerest acknowledgments. The Prefect of the Seine, Baron Haussman, I may also add, displayed the greatest politeness in answering my questions and obtaining for me any document I required.

The **President**, T. L. **Donaldson**, having invited the observations of members upon the paper just read:—

Mr. J. W. **Papworth**, Fellow, inquired whether in Paris a portion of the expenses was not expected to be defrayed by a certain amount of contribution from the owners of the adjoining property; in consideration of its improved value in consequence of these works.

Mr. **Tite**, in reply, said—that such was not the case in Paris yet. Such an idea had been over and over again proposed. He believed it emanated in the first instance after the Fire of London, when Sir Christopher Wren suggested, that it was not reasonable to make large improvements at the expense of the country, without making the owners of the adjoining property, which was so much improved thereby, contribute towards the cost, a jury of inquiry assessing what they ought to pay. The lawyers, however, argued that it would be an interference with private rights, and that if a boon were so conferred, it would not be just to demand payment for it; and the whole project fell to the ground. The proposition was revived by the late Mr. Charles Pearson, with reference to City improvements thirty years ago, but it was not carried out. If they made a man's house worth three times what it was before, he would be much obliged to them, but they could not make him pay for it.

Mr. **Arthur Ashpitel**, V.P., thought he could answer that question almost as well as many, having had important business last year in Paris, which brought him into frequent communication with an eminent French advocate and French architect. The system there appeared to be fairer than our own in some respects; fairer on the part of the State both to the company and the claimant. In the first place our law here compels a man whose estate is taken for any public work to send in his claim and set a price upon his own property. That was contrary to our old English notion that a man ought not to be both buyer and seller. In France the law placed this liability upon the other side. The company must send in the amount they will give for the property, and the claimant within a certain number of days must either refuse the offer or take the money, and in case of refusal he must then state what he thinks is the fair value of his property. The great majority of cases there were settled amicably, or what is there technically called *à l'aimiable.* If parties could not agree, a jury is summoned. Much money in what are called "trade cases" was saved in Paris by the endeavours to respect the position of private parties, and where it was possible to reinstate them in new premises, so that they might lose as little as possible in goodwill and expense of removal. They also saved a great deal of money, as he considered, by taking plenty of land in the first instance. With us it was the practice of companies and public bodies to take the smallest quantity of land possible; after the roads were made the several pieces left were so small and of such awkward shape they would not come into anything valuable; whereas in Paris the severed pieces of land were large enough when put together to form a really substantial and valuable property. He (Mr. Ashpitel) put it to those concerned in these matters whether it was not wiser, supposing it to be a railway company, or other public body, in all public improvements to buy more land than they now do, so that they might put the severed pieces together and have something worth selling, instead of little ill-shaped, three-cornered scraps which were of small value. Reverting to the system pursued in Paris—supposing the parties cannot agree a jury was summoned, similar to our special juries. The panel contained seventy-two names, from which thirty-six were drawn, and ultimately sixteen were taken, four others were also taken, technically called "supplementaires," in case of illness or absence of any of the others. They then proceed in this way:—the claimant and the company respectively lay before this jury, in writing, or as it is called by "proces verbal" all the facts of the case, and also the opinions of the surveyors on either side. All this is done in writing. The counsel or avocats next proceed to urge the points that came before them with all the skill they could exercise;* the jury next took their view of the land. There then was a curious difference from the plan pursued in England. The jury in doubtful cases decided that they themselves would call in skilled persons on whom they could rely, on *their own behalf,* to inform them independently on the subject.† It was a singular practice, but did not seem to be an unfair course. It was to be supposed that those called on one side had a bias in favor of those by whom they were engaged, and the same with the other side, and the jury said amongst themselves "we will call in an indifferent man who can give us light on this matter." The law of the 3rd May, 1841, analagous to our "Lands Clauses Consolidation Act," was a short and clear "Loi," but like many of our own "short acts" much litigation had arisen out of it, and much misconception. For instance, juries seem to have got into the error that by calling some person into their confidence they had made him their umpire, and on his shoulders they therefore shifted the responsibility of their decision, but after a short time a decision was given by the courts to set this to rights.‡ The jury were told this evidence was not to *rule* them, but to *enlighten* them, just as a candle taken by a man in his hand to find his way with in places where he could not otherwise see, assists him but does not guide him. They must not take such evidence though called by themselves, so as to be led by the nose by such person, but must exercise their own independent judgment. All the evidence on each side was read in the open court. The surveyors are considered to be professional men, and therefore gentlemen, and were not even sworn to their statements. There was also no cross-examination, none of that brow-beating which was so disgraceful to the British Bar. The French advocate was a gentleman, and would not stoop to bully a witness. There was another difference in the practice which was also a very fair one. If the jury awarded the sum which was offered to the claimant, the claimant pays the whole expenses; if they give the claimant his whole demand the company does the like; but if they gave an intermediate sum, the costs were divided between the parties according to the ratio of that sum. If for instance a man demanded £2000., and the company offered £1000., and the jury gave £1500., the costs would be equally divided. If they awarded £1750. the company would pay three-fourths of the expenses. This system checked extravagant demands on the part of the claimant, and also deterred the company from making unreasonably small offers. He thought the custom of forcing the claimant to put a value upon his own property was a very bad system; every one knew if he put too little a price upon it he could not afterwards rectify it: besides, he was compelled to put a value upon that which he did not like to part with, and was therefore forced to be both buyer and seller. He was, therefore, compelled "to open his mouth wide enough." The counsel on the other side would catch at this and would say "look at this extortioner, look at their extravagant demands," and the jury was influenced by that. It did not seem a fair way between man and man, and he thought in this respect the French method was preferable to ours.

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* Loi 3me Mai, 1841, Art. 37.—"Le magistrat directeur met sous les yeux du jury—1o. le tableau des offres et des demandes notifiés ex executiv des art. 23 et 24. 2o. les plans parcellaires et les titres ou autres documents produits par les parties l'appui de leurs offres ou demandes."

† *Ibid.*—"Le Jury pourra entendre toutes les personnes qu'il croira pouvoir l'eclairer."

‡ See "Commentaire de la loi du 3 Mai, 1841, par M. V. H. Solon," 8vo. Paris 1850, p. 78, note. See also the "Traité de l'Expropriation pour cause d'Utilité publique, par M. le Chevalier de Lalleaux, Cinquieme Edition, par M. Jousselin." 8vo. Paris, 1856.

With regard to the cost of these improvements, he had been furnished by his friends in Paris with a large quantity of facts, and had he known that the paper would have touched upon this subject he would have been prepared with some of them. What Mr. Tite said was quite correct, the loss was about 60 per cent. He thought himself the French, however, bought rather cheaper than we do, but not very much, for the reasons before stated. But as to the extent to which these improvements had been carried on in Paris and in London there was no comparison. About fourteen miles of streets are now complete, and about seven more are in course of construction in Paris. That is to say, in narrow streets the houses on both sides and all their back premises are pulled down, and thoroughfares substituted 60, 80, and some 100 feet wide, with noble houses on each side. Let them suppose this to be done from Charing Cross, through the Strand, Fleet Street and Cornhill; through Holborn and Oxford Street with cross streets, or rather main arteries from the great railway stations to the Bank—and they might form some idea of what had been carried out in Paris. Those who knew that fine city about ten years ago would marvel at the change. But now comes the question, who is to pay for the outlay? In Paris he (Mr. Ashpitel) believed the State paid sometimes one-fourth and sometimes one-third of the whole cost. [Mr. Tite, nearly one-half.] What the State paid they had the wisdom to raise upon annuities; and managed matters so that such a street would pay itself—say in 1882, another in 1892; and thus the debt incurred by the State, being raised by terminable annuities, gradually extinguished itself. As to the part of the outlay incurred by the City of Paris itself the argument was this "if we can make finer streets we shall do more business, if we can get finer houses we shall get more inhabitants, and thus the increased revenues, whether by octroi or other dues, will enable us to pay the interest upon the annuities, and these will by degrees wear themselves out and terminate." He should hardly have expected it possible that the City of Paris had a larger income in proportion to its size than London. At any rate the present state of things in this metropolis must be regarded as a great nuisance, and he thought the paper they had heard this evening was the most valuable that they had had within these walls for a long time. It was most valuable as shewing what could be accomplished by men determined to set to work for the good of their native city. Such energy in that respect he had never witnessed elsewhere. Here we had streets of large traffic where only one carriage could pass: in other large streets the thoroughfare was blocked every half hour in the day—a complete "jam." Engineers and architects had laid before the authorities economical and efficient ways of getting out of these difficulties; but it was impossible to do it because of this, that, and the other, and principally of all because there was a want of public spirit. It was not for him at the present time to go into the question whether the government of these matters was best vested in a commissioned body or in an elected board of works; but he would say there was a sad lack of public spirit in London in carrying out improvements, and we might take a salutary lesson in this respect from our neighbours across the Channel.

The **Rev. Richard Burgess**, Honorary Member, said he would not attempt to prolong the discussion upon the cost of making Paris, in a few years, what it has become. Nor could he pretend to say where all the money came from which had been spent upon such magnificence. He remembered when he was in Paris, at the time the Rue Rivoli was in the course of construction, he asked the then Vice-Governor of the Bank of France where they found all the money for these great works. "Sir," he replied, the money is not found yet (" L'argent n'est pas encore trouvè ") the fact was that the municipal resources of Paris are provided by the octroi, there was no collection of poor rates or paving and lighting rates in France. The local taxation of the town is confined to a small duty upon all provisions that come within the limits of the octroi, and, in Paris, the annual revenue derived from this source is estimated at about 77,000,000 fr. per annum. [Mr. Tite said about 100,000,000 fr.] He, Mr. Burgess, hoped however that some practical good would come out of Mr. Tite's paper and the discussion of this evening; in whatever way the improvements in Paris might have been effected they put us to shame; for our own metropolis they had but little to show of street magnificence, and they must now act on the defensive to keep the little they had got in any decent manner. It was not more than a quarter of a century since the west-end of the metropolis began to rise in anything like grandeur. It began with Belgrave Square, and it had now partially extended to South Kensington. No doubt we had finer squares and streets now than our forefathers saw. Lord Macaulay told them that in the reign of James II. 1685, Foreign Princes used to be taken to see Bloomsbury Square as one of the wonders of England, and Soho Square was said to have struck beholders with surprise and admiration. St. James's Square had just been built about that time, and there the great mansions of the west-end aristocracy began to be planted. St. James's Square, Lord Macaulay adds, was a receptacle for all the offal and cinders, for all the dead cats and dead dogs of Westminster, and it was not until these nuisances had lasted through a whole generation that the inhabitants applied to Parliament to put up rails and plant trees. But at all events they had improved in that respect. But see how far Paris had gone beyond them; in London if there be a little vacant space, however it might be contiguous to the finest houses, a hundred envious eyes are upon it to get hold of it for every sort of purpose. He had been particularly subjected to that annoyance in his parish of Upper Chelsea. They wanted to get the vacant ground covered with proper buildings, but neither architect nor builder could make any terms. He pointed to the finest parts of London, when he mentioned Pimlico, and those magnificent streets near the late International Exhibition building. They had all hoped that that would have become a splendid west-end of London. Instead of that some of the most unsightly edifices that could possibly be conceived had been erected in the open intervening spaces, and amongst others, a hideous brick building called the Prince's Club; and those buildings, if not removed by act of parliament, would remain to the disfigurement of that suburb of London for the next twenty years to come. He thought this Institute of Architects ought to take up this question and be a sort of police to watch over the London streets and thoroughfares, and protest in the name of the profession against the metropolis being turned literally into a coal depôt. He hoped they would not look upon this as an unmeaning proposition. They all knew what was the effect of the memorial they drew up to get that most extraordinary building of the International Exhibition removed? He believed that memorial to Parliament had really the effect of upsetting the proposition of the Government to retain that building; and if in future they represented in the proper quarter that a set of arches—euphoniously termed a viaduct—was to be carried across Ludgate Hill, or any other similar disfigurement of the City, he believed that representation would be listened to. He should like that a number of gentlemen, whose names would carry weight, should form themselves into a committee of inspection. Of course they would have no legal power to interfere, but they would stand forth as conservators at least of the little magnificence that London possessed. They had representations made at Chelsea of 20 ft. deep cuttings for railways, and his house might be situated ere long by the side of such a cutting, and if he wanted to go from one part of his parish to another he would have to go over one of these bridges, which were promised in the prospectuses to be so elegantly constructed that he would be glad to have such ornamental structures in his parish. Whilst Paris was fast rising into magnificence we were retrograding, and the only pieces of good streets that we possessed were in danger of being cut up by innumerable projected railways, so that we should have nothing to present to the foreigner's admiration except the mere unsightly bulk of our great city. He hoped some practical good would arise out of this discussion. This was certainly the proper body to look after such things; and it was quite competent for them to remonstrate, as they did in the case of the International Building, which still seemed loath to quit its site. In the meanwhile he thought it a practicable thing for this Institute to form a committee to watch these proceedings; and before things went so far that they could not be stopped, to let it be known to the members of the legislature that the metropolis was just now in danger of being disfigured for ever.

Mr. Jennings, Fellow, wished to say one word respecting the question of cost. It was quite clear that these improvements were very costly, and the great question was whether they were remunerative, and whether they could deal with the whole of London as one large estate. If improvements were made over the whole metropolis it did not appear to him an unfair thing to take into consideration the improved value of the total property. The difficulty arose from the attempt to raise money from those individual houses only, which were benefited by the improvement. This was impossible, but if the whole of London were improved upon some general and fixed system, and all the property brought into a more valuable state, it would then pay by its increased value, and the whole would become, as in the case of one estate, a much more valuable property. With reference to the general improvement of the country in connection with railways, he had made a calculation which showed that if they took the increased value of land within three miles of a station, the cost of the railway itself would be more than covered by the increased value of the land.

The President said, he was in hopes that some one would have taken up the question, not merely with regard to the cost, but as a necessity in this metropolis. They were at this time in a deplorable state, from one end of it to the other, and business and commerce were thereby impeded, and it was impossible to go from one part to another with any comfort, or within a reasonable period. He (the President) had mentioned to the Secretaries, that it was his intention to call the attention of the Institute to this subject, and he thought it desirable to follow out the suggestion that had been made by the Rev. R. Burgess, that they should memorialize the Government to appoint a commission to consider how the thoroughfares of this metropolis might be improved and rendered fit for its commerce. It was for them to show the necessities of the case, and that the inconvenience must be removed; also that the means of effecting it must be found. No one could dispute the obvious fact, that considerable losses were incurred every day through the frequent stoppages which occurred in the thoroughfares. It appeared to him, that many new streets were wanted, and the numerous projects now before the public, went to prove that there was a vast necessity for them. As to the question of cost, there was a project of a company on foot, for expending £9,000,000 sterling, in the construction of a sub-way to connect one part of the metropolis with another. It was to our shame as a community that such a state of things should be allowed to continue, if a private company could lay out such an amount as that (he understood they had £850,000. ready to deposit in accordance with the Parliamentary regulations) upon what was only a private enterprise to satisfy a mere local necessity, which was but a minute part of the entire necessities of the metropolis: not merely one, but at least a dozen such works were required. Coming from South Kensington for example, how did they get to Charing Cross? and how to Waterloo Bridge thence? It was one of the most indirect and tortuous routes that could be imagined, as also was that from the end of Oxford Street to Charing Cross. Again, coming in the same direction from the London and North Western and Great Northern railway stations, the necessity for more direct communication with the

Thames from those points was most apparent. Then again how did they get from Shoreditch to Waterloo Bridge? Why should they not have a street going direct from Shoreditch Church to Waterloo Bridge, with a branch to London Bridge? They wanted new means of communication from north to south as well as from east to west. If our Government would lay down a system of that sort—and the necessity for it become daily more and more pressing—there were vacant spaces at present existing which might be taken for the purpose. Unless it was done forthwith, it would be almost impossible to do it a few years hence. If Government laid down a scheme for these improvements the question of money must follow as a matter of course. Alteration in these respects was a dire necessity, it was not possible to exist without such being carried out; matters had arrived at that point that Government must undertake such a scheme, and then if there were any private companies that wanted communication from one part to another, they might be made to subserve these great lines of communication, and come in to bear part of the expenses. It was for them as an organised Institute of Architects, to go before Parliament and submit to them a scheme of the kind described, and to memorialize the Government to appoint a commission, and to hold in suspense those railway and other public projects in the metropolis, until a proper and comprehensive scheme was laid down, not for the benefit of this or that company, or for individual or speculating parties, but for the general convenience of the metropolis. With respect to the subvention of Government towards these projects, he held that a Government ought to come to the assistance of a great metropolis like this; nor should such aid be restricted to the metropolis, but extended to every city throughout the kingdom, and he was quite sure that if this was done, the progress of public improvements in this country would be very remarkable. He (the President) had been at Leeds last year, and had found that nothing could be worse than the thoroughfares of that town. Local parties in such places were only partially interested in the matter; tenants had such short leases of their occupation, that they would not put themselves forward to carry out such improvements, but they would do so if they were assisted by Government. When they regarded London as the great Metropolis of the country, and looked at the fact, that the great obstructions of the thoroughfares were chiefly occasioned by the confluence of strangers, the country at large ought to contribute something to that which would facilitate public business. He (the President) now proposed that a day should be appointed in January, for considering the question of an application to Government, and pressing this subject upon their attention without further delay, rather than leave it to be done in the partial, imperfect and defective manner in which he conceived it would be carried out by the various companies which now had projects before Parliament.

Mr. T. H. Lewis, Fellow, said that if, as he hoped, the committee should be appointed as proposed, he trusted that they would be allowed to avail themselves of a most comprehensive scheme for the improvement of London in every part, prepared by our Fellow, Mr. F. Marrable, who, when superintending Architect to the Metropolitan Board of Works, had carefully considered the subject, and laid down a very elaborate plan not only of the main lines of streets which are required to be improved or newly formed, but had made many valuable suggestions as to other minor improvements which would be likely to escape any one not so necessarily conversant with the subject as Mr. Marrable. The scheme would be of great service to the Committee, and he hoped that they might be favored with the use of it.

Mr. Charles Fowler, Jun., Fellow, rose to propose a vote of thanks to Mr. Tite for his paper. Having been himself in Paris lately, he felt the more interested in the results mentioned. He hoped the authorities in this metropolis would not be deterred by the financial results in Paris from prosecuting some improvements that were contemplated, and from entering on others still more important. If the Institute went before Parliament in the way proposed, there were two points which he hoped they would particularly insist upon. One was to beg Parliament to consider very carefully before they sanctioned individual schemes, out of the many which were brought forward, which were all partial schemes, laid down without any general idea at all but merely to connect one part with another. The other point was, that in doing this, they would not sanction the occupation of the few open spaces which still remained in London. They had too few of them now, and the railway companies were anxious to seize upon these as sites for their stations, as in the case of the Finsbury Circus, which was nearly secured for that purpose.

Mr. **Marrable**, Fellow, said he had great pleasure in seconding the proposition of a vote of thanks to Mr. Tite, and added in reference to the suggestion of Mr. Lewis, as to the advisability of some comprehensive plan for Metropolitan Improvements being prepared under the auspices of the Institute, that he had by the direction of the Metropolitan Board of Works prepared such a plan some few years ago—that after carefully examining all the Parliamentary Blue Books on Metropolitan Communications he had selected such plans as seemed best calculated to work well together towards a general improvement of the Metropolis, and he had added many suggestions of his own, so that a comprehensive system was arrived at and laid down on the large scale Ordnance Map. The map was laid before the Board, with an approximate estimate of the cost of the several improvements which amounted in the whole to £19,000,000. The members of the board were frightened at the amount, and the plan was laid on the shelf, but probably it still existed in the strong rooms of the board. The boldest portion of the scheme was the widening of Cheapside; but as it was also proposed to improve Holborn Hill and increase the traffic in that direction, and to open a new thoroughfare through Paternoster Row, across Farringdon Street, Carey Street, &c. to Regent Street; to remove Temple Bar, and carry a new bridge over the river at St. Paul's, he thought it would be bringing too many main arteries to one point, without widening Cheapside, through which all the increased traffic must pass to the Bank, Royal Exchange, &c. Mr. Ashpitel had remarked that public companies did not take enough land, and argued that by taking additional land they would recoup themselves. He did not agree with that. It was like the old sum—"if a herring and half cost three halfpence how much would three cost?" They might get one acre of land for £1000., and the next acre might cost £2000., merely from the difference of locality. He therefore questioned the economy of taking more land than was necessary for the street they desired to carry through it. They must have sufficient building depth, but if they took more it was a loss. In the instance of the new street in the Borough, which he in a great measure carried out, he was careful not to take more land than was necessary, but generally speaking it was enough. In one or two points he was rather pinched in the avoidance of important property which would have cost a large sum and produced but little ultimate return. His own experience led him to the conclusion that it was advisable to take as little land as possible. From the devious lines of property they were necessarily obliged to have a good deal of surplus—some deeper than was required, whilst some was not so deep as was wished. Mr. Ashpitel had also referred to the method of compensation adopted in Paris. He (Mr. Marrable) was not sure that it was a better plan than our own. In such cases the chances were that a government surveyor would be engaged by the jury, and whether he would hold the scales evenly he could not say. He thought the system of arbitration was, generally speaking, the best. He did not think a jury a good tribunal in such cases, because they had twelve men who were obliged to hear conflicting evidence, and their ears tickled with high-flown speeches from counsel, and after sitting five or six hours their mind and body were fatigued, and they were only too anxious to get rid of the whole affair; and it might be that they would take the highest figure given by the companies' surveyors, and the lowest on the part of the claimant, add them together and divide by two, which would be their assessment. He therefore thought a jury was a most incompetent tribunal to try such conflicting cases, the speeches of counsel only serving to obfuscate their ideas a little more. But with a skilled man acting as arbitrator, who could, if he pleased, reject all the evidence and act upon his own opinion, and bring his own professional mind to bear upon it, he believed they generally arrived at something like the real value, and he did not think that system could be improved upon.

The vote of thanks to Mr. Tite having been carried by acclamation, Mr. Tite, M.P., said as it was probable he could not be present at the next meeting in January, he would embrace this opportunity to say that the necessity for these improvements was admitted on all hands, yet the great difficulty was how to pay for them. The late Richard Lambert Jones, who did so much for the city of London, on one occasion, laid before the Duke of Wellington a plan for some improvement which his Grace admitted was a capital scheme, but he went on with the following anecdote, having reference to this very important question of means—his Grace said, that it was the custom of the vestry at Strathfieldsay to dine together once a year—but when it was first proposed, one of the party, a wise old farmer, stood up and addressing his Grace said "its all very well my Lord Duke, but before I eats this dinner I wants to know who's to pay"—it was all very well to talk of grand schemes of street improvements: but let any man get up in the House of Commons and propose to pay for such schemes out of the consolidated fund, and he would only be laughed at. The members for other cities and towns always said "we do not ask you to make our public parks or pay for our public improvements," and he feared there was no chance of the general finances of the country being used for the purposes of London only; and looking at the large amount of rating due to the Main Drainage, the Thames Embankments, the New Street to the Mansion House, he could not suggest any means by which further improvements could be paid for. As to the wild speculations of railways spoken of there was no money of the public or any real company, he believed, in any one of them; and the money spoken of as deposited was generally borrowed and guaranteed by some astute lawyer, or speculative engineer, and the projects themselves were only the speculations of contractors, engineers and solicitors. With regard to the question of the English mode of managing compulsory purchases, nothing could be worse than the present system. A jury was a reasonable process, but at a comparatively recent date the legislature had allowed claimants to choose an arbitration if they thought fit; no doubt the arbitration was intended as less expensive and tedious—but the mode at present adopted was most costly, mischievous and ridiculous. It was this, the surveyors appointed on both sides met and appointed an umpire—suppose the President or some first-rate man—a day was named for a meeting when two counsel on each side and half a dozen witnesses (not to matters of fact but of opinion) and this process was continued sometimes for days, to settle questions which half a hour's quiet talk of the arbitrators and umpire might have easily and economically determined. £6000. or £7000. in expenses had often, he believed, been the cost of such enquiries. He, Mr. Tite of course did not deny there were cases in which really honest difference of opinion might arise, and care and thought, and consequent expense must be incurred; but what he complained of was that the process he had described was employed as a matter of course, and for the simplest cases. He liked the French system much better. In the Paris and Rouen Railway the counsel for the company, Mons. Baud, bought all the land. When it was necessary to go before a jury he did so, and he, Mr. Tite, was once present: after all the documents and valuations had been read before the court and jury Mons. Baud pulled out his watch, laid it on the table, and said he would not occupy the jury more than twenty minutes. He described the whole state of the case—this paper shewed this, and another paper shewed that—and after twenty-two minutes speaking he said to the jury "now, gentlemen, I have kept my word as to time, and you will now be good enough to say what the company have to pay!" To return, however, to the subject of the paper, he hoped something was doing and would still be done for the removal of the reproach which existed even before the Fire of London, for Evelyn in describing in his diary his passing through the City before that event in going to visit St. Paul's, then, perhaps, the finest gothic building in Europe, thus wrote, "I could not help feeling as I wandered through the crooked and crowded streets that it was the ugliest city for its bigness in Europe," and he (Mr. Tite) did not think they had hitherto done much to redeem it from that reproach.

Note.—Mr. J. W. Papworth, Fellow, points out that under the head of "De l'expropriation pour cause d'utilité publique," by J. Nourrigat, Architect, in the Révue Générale de l'Architecture et des Travaux Publics, 1853, xj. 179—210, will be found full particulars of the system of compensation referred to in the above discussion.

42 L Sq
26 Dec 1863

My dr Mr Tedder

I return yr mag Paper & Speech both corrected – Pray let me see a Revise & kindly send me anoth Copy of Mr Earl's Lett about Elmes – for I have sent the one I had to him —

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42 L Sq
Monday

Mr Tite regrets extremely the delay with the enclosed Papers – he did not know they pressed & he only received the Proof from Liverpool yesterday

A DISCUSSION

Upon the Paper ON THE IMPROVEMENTS IN PARIS, AND THEIR COST, by W. TITE, M.P., F.R.S., Past-President, read at the previous Ordinary General Meeting of the Royal Institute of British Architects,

And upon THE SEVERAL PROPOSED SCHEMES FOR RAILWAYS IN LONDON, AND THE GENERAL SUBJECT OF AN EFFICIENT SYSTEM OF STREET COMMUNICATION BETWEEN THE VARIOUS PARTS OF THE METROPOLIS,

At the Ordinary General Meeting of the Royal Institute of British Architects, January 4th, 1864,

THOMAS L. DONALDSON, President, in the Chair.

THE discussion was opened by Mr. FREDERICK MARRABLE, Fellow, who, adverting to the plan prepared by him in 1859 for a comprehensive scheme for the improvement of the streets and thoroughfares of London, to which allusion was made at the last meeting, said, that having found a copy of that plan amongst his papers, he had great pleasure in presenting it to the Institute. The portions coloured blue upon it represented the improvements that had been carried out by the Metropolitan Board of Works, or were still in progress; the portions coloured red were works projected. He thought, therefore, that plan might be of some assistance to any committee of members of the Institute which might hereafter be appointed to devise a general scheme of Metropolitan improvements. The estimates for all those works he had not thought it desirable to bring forward on this occasion, because they must necessarily be very crude, and it was doubtful whether they would be realised; seeing that if the schemes were not carried out within a reasonable time, the value of property altered so much, that an estimate made in 1859, would be no criterion of cost for improvements carried out in 1870. The other little publication (Mr. Marrable added) was presented to him on Friday last, when he accompanied the members of the Metropolitan Board and others on the occasion of the opening of the new Southwark Street and subway. He had presented that pamphlet to the Institute because it gave the estimated cost of the street in 1857, and the actual expenditure upon it up to December, 1863. The estimated cost for the purchase of property and goodwill of premises in 1857 was £464,137. The actual cost of the same as now completed was £480,012,—not a very great discrepancy. He had put down 10 per cent. to cover contingencies, professional, law, and other charges, = £46,412. He was happy to say, calling to mind the remarks made at the last meeting as to the exorbitant charges of professional men in such cases, that the contingent expenses, instead of being 10 per cent. were little more than 5 per cent. the actual amount being £27,936. instead of £46,412. There was an extra cost upon this street of £40,228. beyond the estimate of £8,875. for paving and sewer only, caused by the formation of a subway not originally contemplated, and by the building of vaults to the houses. It was originally intended that the lessees, as they took the plots, should build their own vaults; but it was found better, in connection with the subway, to build the vaults for them. The repayments in this respect would amount to £10,572. off the £40,228., so that the actual cost of the subway,—a most important improvement in all new streets, and in old ones as well,—was only £29,656. for a length of 3,450 feet. There was another curious item in these figures. He had estimated the return from the sale of old materials, at £9,283.,—the sum actually realised was £9,982. [The President asked how much the subway had cost per foot run.] Mr. Marrable replied that he had not carried out that calculation; he only had the total figures, but he believed it was a little over £8. 10s. per foot run. The value of property re-sold already amounted to £69,917., and the diminution in the actual cost, as compared with the estimated cost, was £30,651., so that they were not always to be accused of being greatly in excess of their estimates. [The President inquired what was likely to be the actual cost of that improvement, including the subway.] Mr. Marrable replied £290,000. That, however, depended partly upon estimate, because the property was not all re-sold. He had arrived at the gross cost, but he had not got the actual returns; but they could judge pretty nearly what they would be, as a good deal of the property had been re-sold. He might say in round numbers the actual cost of the street would be £290,000.

The President, Mr. T. L. Donaldson, said, he would take this opportunity to say a few words on the subject of Metropolitan Thoroughfare Improvements. Inasmuch as serious obstructions constantly occurred, it was a matter of absolute necessity that such improvements should be carried out at once, unless they wished to come to a dead lock in all their social and mercantile traffic operations; and the question of the traffic of the City more particularly must be taken up now, or he knew not when the evil could be remedied. Members would recollect Mr. Tite, in reading his paper drawn up with so much care, did not touch so much upon the works carried out in Paris, as to their necessity or the advantages derived from them, as upon their mere cost. That was the extent of the paper, showing how much money had been laid out in these large public improvements. It had, therefore, occurred to him, that it was desirable to bring before the Institute a few facts, as to what had been done in this way in Paris. Although the Metropolitan Board of Works were alarmed at Mr. Marrable's estimate of £19,000,000! it was proper they should know the results of the large outlay in the adjoining capital. He had procured from the Hotel de Ville some details of the works. The operations contemplated of boulevards, streets, avenues, and other lines of thoroughfare, represented a total length of 22½ miles! of these there had been already executed 17 miles. The width of the streets varied from 40 to 60 ft., and of the boulevards and other larger avenues of communication from 65 ft. 8 to 111 ft. 7. The Rue de Rivoli was the first work in continuation of the plan designed by the Emperor Napoleon I. He should state, that amongst various conditions to be answered by these works, one was strategical, viz. the giving ready means of communication between all parts of the city in case of insurrection, so that the military might not be impeded in their operations against a mob. This had somewhat influenced, no doubt, some of the operations recently carried on in Paris—not that they had been executed for that sole purpose, but it was one amongst other motives, at all events. This, however, would not form any consideration in dealing with the subject in London. In laying out cities, or even in improving them, there were three leading principles to direct the operations—convenience, health and beauty. In connection with our own Metropolis, the first essential condition, admitted by all, was convenience; the next was the sanitary condition of the city. In many parts London was positively unhealthy from the conglomeration of houses, without direct thoroughfares leading into each other, to produce drafts and currents of air; and the sanitary condition of the atmosphere was inferior to what it would be, if there were straight lines of streets in those localities. At the west-end that evil was corrected by the squares, which served as the lungs of that portion of London, and there the circulation of air was perfect and large. The third condition—which ought not to be lost sight of by the authorities directing these works—was beauty of effect; for to all but the rudest and vulgarest mind, it was necessary that there should be not only utility but enjoyment in inhabiting a city—something to please the eye and the fancy, making it a pleasure as well as a convenience to walk through the streets. Those were the general conditions, which should guide improvements and the laying out of streets, and they had been very much attended to in Paris. There it was not thought sufficient to have streets running from east to west, or from north to south, but the Emperor had proposed diagonal lines, by which means passengers and vehicles arrived rapidly at the points desired. This grand conception he believed was entirely due to the Emperor himself, who, he was informed, defined the lines of the streets with his own hand. He had seen the rough plan which his Majesty had himself traced out for the whole of the works at the Bois de Boulogne. The plan so sketched was then placed in the hands of proper persons to draw out the details and technicalities; but the grand conception was due to the Emperor alone. The plan of Paris exhibited on the wall had all the new "percements and allignements" marked in colour: those already completed in purple, those contemplated in pink.

General Table of some of the new principal Thoroughfares in Paris:—

Names of Thoroughfares.	Lengths.			Widths.	
	Metres.	English feet.	Parts of a Mile.	Metres.	English feet.
Rue de Rivoli	2,200 =	7,233 =	1½	22 =	72
Boulevard de Strasbourg	900 =	2,955 =	½ } 2½	30 =	98·6
Do. do. continuation from Bt. S. Denis to l'Avenue de l'Observatoire	3,400 =	11,162 =	2	30 =	98·6
Boulevard de Malesherbes	1,700 =	5,582 =	1	34 =	111·7
Do. do. continuation and opening into the newly annexed zone of Paris	1,400 =	4,597 =	⅞	30 =	98·6
Boulevard du Prince Eugène	3,300 =	10,834 =	2	30 =	98·6
Boulevard de Beaujon	2,200 =	7,224 =	1⅜	30 =	98·6
Boulevard S. Germain	1,100 =	3,612 =	nearly ¾	30 =	98·6
Rue La Fayette	900 =	2,955 =	½	20 =	65·8
Rue de Puebla, newly projectcd	1,400 =	4.597 =	⅞	20 —	65·8
Rue d'isolement of the New Square Buttes-Chaumont	1,800 =	5,910 =	1⅛	20 =	65·8
	Total ...	...	12½ Miles		

The Rue de Rivoli was 2,200 metres in length, and 22 in width, or 7,223 English feet, equal to 1½ mile, and the width 72 feet. This was found to be an insufficient width in laying out a street of such importance and large traffic: it was begun under Napoleon First, before the full importance of the subject had been felt, and when only very imperfect notions were entertained upon the matter, and its continuation was necessarily limited to the original dimension. The Boulevard de Strasbourg, under Napoleon III, was 900 metres in length, and 30 metres wide: in English measurement 2,955 feet, or half a mile, and 98 feet 6 wide. That noble dimension was not too great a breadth; for those, who had seen the number of vehicles of all kinds going through this leading thoroughfare, must have been sensible that it was not more than sufficient—and the foot-pavement necessarily occupied a great portion of that space. Then they came to the Boulevard de Sebastopol, a continuation of that of Strasbourg, from the Boulevard S. Denis to the avenue of the Observatory. The length was two miles, in addition to the half mile of the former, and from one end to the other the whole was 2½ miles, and 98 ft. 6 in width. There was a bridge about 100 yards more to the west, which was out of the straight line. We in England should have taken the street down to the bridge, and carried on the street at an angle; but, in Paris, they took down the bridge and rebuilt it 100 yards more to the east, so as to preserve the straight course of the boulevard. Then they came to the Boulevard de Malesherbes a very magnificent one, 5,582 feet, or one mile in length, and 111 feet in width; in addition to which there was partly opened in the zone lately annexed, outside the ancient limits of Paris, a further extent of 4,597 feet, 98 feet 6 in width, at the commencement of which ample space was left for the building of the Grand-Opera House, which was to cost a million of our money. Churches were erected on these grand lines, and every section of the city would have a large church—we, from their size and importance, should call them cathedrals—their average cost might be taken at about £150,000. each. This showed the vast extent of the operations going on in Paris. Then they came to the Boulevard du Prince Eugène, 1¾ mile in length, and 98 feet 6 in width. He was there in November, 1862, and again within the last few days, and he was astonished to find that, where previously he had seen the mere lines of the thoroughfare traced, now lines of houses were erected, 5 and 6 stories high. Another remarkable feature was a rich triumphal arch, larger than any previously erected, the perfect model of which the Emperor had had set up, with all its embellishments, to the full height: at the period of his last visit all the model was swept away, and the permanent works of the arch were about to be commenced. Then they came to the Boulevard de Beaujon, 1¾ mile in length, and of the same width as the others; then the Boulevard St. Germain, three-quarters of a mile in length, which was a portion of the contemplated improvements to be effected in connexion with the other side of the Seine, by means of a circular boulevard, to provide easy communication round that part of the city. Next they came to the Rue de Lafayette, half a mile in length, and 65 feet 8 in width; and also the Rue de Puebla, one of the projected streets in the annexed zone, which was seven-eights of a mile long; and lastly, to the streets of insulation of the new square of the Buttes-Chaumont, 1⅛th mile in length, and also 65 feet 8 in width, the square itself being commenced, and having a superficial area of 55 acres. This was a small portion only of the works, but it gave them some idea of the vastness of the operations carried on in Paris, which would result in magnificent avenues, bordered with houses and trees, where the eye could hardly reach from one end to the other. The mode of carrying on these operations was this:—The municipal administration of the city, under the Prefect, prepared plans, carrying out the ideas suggested by the Emperor: when decided upon, the projects were submitted to the Council of State, and it was sufficient for them to declare, that the works were for the public good, and that was sanction enough for them to be carried out. There was a law by which they then went through other necessary steps. They gave proper notices to the parties of the intention to buy up the property, and they had heard already from his friend, Mr. Ashpitel, the mode in which the arrangements with the parties interested were completed. Having purchased the property, the houses were sold for demolition, and many persons had realised large fortunes by such operations; the land was then handed over to the municipal engineers, and marked out the lines defining the width of the street, the roadways and pathways respectively. The Municipal authorities constructed the sewers, roadways, carriage and foot pavements. Hitherto they had not built any cellars under the pavement. The roadways having been duly prepared, a regulation was made that the houses should be built of a certain height, the lines of the principal cornices and stringers being definitively fixed according to certain data. If a party took a good length of ground he might possibly be allowed not to make his houses either so high or so low as the others. But it was a remarkable fact, that so valuable was ground in Paris, and consequently so necessary was it to realise large rentals to cover the ground rent, that the houses consisted for the most part of six or seven stories, each one very low, so that a good suite of rooms, commanding a rent of one to more hundreds a-year, would not be more than eight or nine feet in height. The studio of a photographer in the Boulevard Montmartre realised a rent of £500. a-year, merely for a suite of rooms on the roof of the house. With houses of six stories, they must imagine the immense profits appertaining to house property in Paris. When the houses were erected, the freehold was sold to the parties, who paid a certain amount down, and were under engagement to pay the remainder within two years, and also the cost of forming the road and pathway. Within that period they must likewise have covered the property, or else it was forfeited. The great purpose of the authorities was to get the several works finished off, and the whole improvements carried out as rapidly as possible. They would see by looking at the lines on the map before them, the great facilities there were for getting from one part of the city to another—a most important point in a commercial point of view. If the conveyance of merchandise occupied four hours instead of two, they might imagine how much more it would add to the original cost of an article: therefore the quickness with which goods could be transported from place to place was not a matter to be disregarded. In their own individual experience, when they allowed a quarter of an hour more time to get through the city to reach a particular railway train, and it took half-an-hour, and they did not reach the train in time, they could appreciate the loss, which arose from the want of a proper circulation of the traffic in our thoroughfares. To effect that had been one great purpose of all these operations in Paris, and they knew within a little what the cost had been, and he had told them the extent of many of these operations. His friend, Mr. Edward Hall, would be able to give them a more detailed account of this subject. He (the President) had contented himself with giving a general view of the operations in that city.

With respect to London, they must recollect in any future operations what were at this time the principal accesses to the town, because all depended upon this as a starting point, viz., the traffic coming into a place and issuing out of it. Formerly the principal accesses on the left side of the Thames were from the East by Whitechapel; from the North by Islington; and from the West by the Edgware Road, Oxford Street and Piccadilly: but all was now changed, inasmuch as the main accesses were the various railways having their termini in different positions. That, which was before essential as an access, was now used for secondary purposes, and now was the time to form other arterial lines of access and approach to and from these great termini. But the question was, should it be left to the railway companies, or to private individuals or associations, to carry out these great and necessary operations? What interest had they in the convenience or beauty of the city? For their own gain they would carry people and goods from one part of London to another; but that was not a matter affecting the public interest in the question of the general improvement of the main thoroughfares: therefore it was for the governing body to devise a proper scheme, and carry it out in the first instance. They had all seen the plan which had lately been published by Mr. Wyld, showing the various railway schemes projected in the metropolis, which, instead of being a habitable city, would have railways in all directions, to the great annoyance of society. In Paris an excellent system of communication existed from one railway station to another, which was another point very much in favour of the interests of the public. He therefore thought that, in many of these matters, they in London would do well to take what had been done in Paris as the basis of their operations—especially with regard to the termini of the railways, and not only unite them by means of direct and convenient thoroughfares, but above all, to give them a ready access to the river. They did not want the lines from east to west so much as those from north to south, to relieve those running from east to west; because at present the thoroughfares were so insufficient from north to south, that the traffic was necessarily driven into the lines of communication from east to west. Look at the present route from the Great Eastern station in Bishopsgate to the West-end. It was through narrow streets, encumbered with an enormous traffic from morning till night. There ought to be a straight line from the Shoreditch Station to Waterloo Bridge, cut right through in a direct line; and they should have other lines from the other railways, as the Great Northern and North Western, in the same way: these, intersecting each other, would become the main lines of communication. How should they get from Kensington to the Victoria Station? It should be by the Cromwell Road, 100 feet wide, which should be continued in a direct line, and take them down to Victoria Street. There was every reason why they should have diagonal lines of streets, commencing from the western end of Oxford Street to Charing Cross direct, and by such means they would establish great arterial lines of communication, which would be of the greatest utility: the same system should be carried out on the other side of the river. He felt it was their duty to call upon Parliament to suspend these various railway projects, which would only serve special interests, till the whole system of the thoroughfares of the metropolis had been investigated by a committee of the legislature, and some plan for the general public good devised. He therefore begged to propose a resolution as the basis of the discussion this evening, (as in the case of the Exhibition building of 1862), namely,—"That it be referred to a committee to draw up a petition to Parliament and to the Government, suggesting that a committee should be appointed to examine the general subject of street communication and embodying various recommendations; the said draft of petition to be submitted to an early meeting of the members." He merely submitted this resolution for the purpose of opening the subject. Other gentlemen present were capable of dealing with it better than he had, and he hoped the Institute would have the benefit of their advice on so important a matter as that now under their consideration.

Mr. EDWARD HALL, F.S.A., Visitor, said he was afraid he was not at the moment prepared as he could wish, in order to do credit to the Institute, and to the information which he had been able to collect on this subject. The paper read by Mr. Tite at the last meeting, seemed to him to involve some inaccuracies, resulting from the incompleteness of the statement laid before them: that was to say, the mere figures of account, though not inaccurate in themselves, became to some extent so, from not including all the items which should be taken into the calculation.

The PRESIDENT said it was quite understood that the Government itself, independently of the Municipal authorities, contributed one-third, or one-half, and sometimes even more, towards these public works in Paris.

Mr. HALL observed that that was not the point he was adverting to; but he said he had been favoured with a copy of the "Mémoire," dated 1858, of the Prefect of the Seine, to the Municipal Council of Paris, which gave the exact sums then to be contributed by the Government in aid of the great division, actually in progress, of the general works, as well as the total sums estimated to be expended.

The PRESIDENT remarked that the first operations began in 1849.

Mr. HALL assented. He had brought with him a plan, which had been kindly posted, expressly for him, up to the date of 1861, by Monsieur Deschamps, the head of the Bureau of the Hôtel de Ville, charged with the "Service du Plan de Paris," and had been also gone over by himself. This plan showed, first, the works of street-improvement completed since 1848; secondly, the further works which had received the sanction of the Imperial decree, up to 1861, many of them now completed; and thirdly, works projected, but which in 1861 had not been decreed. Mr. Hall went on to say, that what he wished to notice in the first instance, was the argument which Mr. Tite offered to them, or rather the conclusion which seemed drawn from the statements and figures, namely, that if New Cannon Street had cost a certain sum, and if a *deficit* at the time was involved in its formation, such a street ought not to have been made. That was the conclusion propounded by Mr. Tite, or there was nothing at all in the argument. He (Mr. Hall) had paid much attention to the subject of the improvements of London, and having been resident in Paris from 1860 to 1862, he had been able to see that a great deal of information might be derived from what was in operation there. The Boulevard de Malesherbes was one of the lines referred to as having cost a very considerable sum, and as resulting in a loss. The result, however, should not be altogether judged of by a comparison of cost with the length of the line from the Madeleine to the nearest corner of the Parc de Monceaux,—under a mile,—or not much more than a mile from the Opera. [The President, 1700 métres.] It was true, as stated by Mr. Tite, that the amount of cutting in earthwork, was very large indeed; in some parts being about thirty feet in depth. The peculiarity of all the improvements in Paris was the production of straight lines, not only on plan, but in section or gradient. They did not take the varying gradient rising up a hill; but they cut through the obstruction. Notwithstanding the enormous expenditure upon that work from the Madeleine to the corner of the Parc de Monceaux, he ventured to say, if it was not justifiable, it was not inexcusable. Previously to the recent formation of the Boulevard de Malesherbes,—originally an idea of, and even commenced under Napoleon I,—the whole of the district immediately beyond the park was a desert spot. At the time he (Mr. Hall) went to Paris, that district was unoccupied by houses; and other districts beside it, for want of means of access, had been scarcely utilized, as now they might, and were beginning to be. They must not only take into consideration the waste area immediately beyond the park, but also all parts beyond the fortifications, including Clichy, Courcelles, and Neuilly, and even Asnières across the Seine, and Courbevoie, to which last it was probable access by a bridge would shortly be given. During the time of the first Napoleon, it was intended to form a port for ships at this point; and that project had been revived in the scheme of a ship-canal from Dieppe. There were facilities there for forming a considerable port; but whether that were carried out or not, the whole of this area on the north-west side of Paris would be capable of being appropriated for dwellings. A characteristic of Paris, as of all other cities, was the too close crowding of the working classes in the centre of the town. The only way to provide an outlet for them, was to form direct routes from the central districts to the suburbs. Such an outlet was provided by the Boulevard de Malesherbes, by which also the Parc de Monceaux was utilized and rendered a pleasant place of resort. He therefore contended that the return of the cost of that boulevard was not to be calculated on this short length alone, but it should be considered as that of a means of access to far distant quarters of the suburbs. The same might be argued with respect to the Boulevard du Prince Eugène and the Rue Lafayette, and generally to the main routes recently formed. He believed the joining together and equalisation of the quarters of a city was of very great importance to the social amelioration of the people, in the same way that the opening of roads in the country, and ocean steamers, were agents of civilisation. There was one great peculiarity,—which the President had slightly alluded to,—in the system of the Municipality of Paris, carried into effect in their street-arrangements. If any large building, such as an *hospice*, even the corner of it, formed an obstruction in the desired line of street, it was removed and placed elsewhere. What should we do in a similar case? Supposing a route from Charing Cross to Islington was made, which was much wanted, and supposing the line was intersected by Coldbath Fields Prison, we should carry the line round the angle; but the French would not often be satisfied with even cutting off the corner; they would remove the entire building for the sake of preserving the straight line. That might seem an exceedingly expensive way of going to work, but he contended it was advantageous. These *hospices*, some of them gigantic establishments, and together filling great areas of ground, had fulfilled their office in the centre of the metropolis; and it was most desirable that they should be removed to suburban localities, and the ground on which they stood be devoted to workmen's dwellings. In addition to what the President had stated on this subject, he would say there were not only these routes laid out in direct lines from the centre to the outskirts, and similar direct lines forming the best means of communication from one railway station to another, but there was an excellently designed girdle-railroad, the Chemin de Fer de Ceinture; (at least, the southern portion, if not open now, would shortly be so); and they had nothing corresponding to that in London.

The President said the North London Railway, connected with the other lines, was the nearest to it.

Mr. Hall added that the question they had to consider in drawing a comparison between Paris and London, was, not so much what was the comparative position now, as to matters of mortality and water-supply, which Mr. Tite alluded to, not only on the last occasion, but in his address as President of the Institute, in 1861, but what would be the comparative position of the two capitals in ten years hence? He (Mr. Hall) accepted a great responsibility in appearing before them; and he was afraid he should not do justice to the argument as to the advantages to be derived by London, from the experiences of Paris. But there was a good deal to be said as to the progress which the Municipality of Paris had at present made in those points on which we took considerable credit to ourselves, more especially in sanitary matters. He believed, in a short time, the water-supply of Paris would be vastly superior to that of London. Mr. Tite, in one of his addresses, had stated that he thought the quality of the water in London could not be greatly improved. He (Mr. Hall) did not complain very much of the quality, but that the quantity was insufficient. In many parts of London, there was no water to be had on Sundays. It was true, the water-supply of Paris was very defective at present. It was, for example, inferior to ours, in that the service was not carried to the upper floors of the houses. Generally speaking, the pipes were not carried to the tops of the houses communicating with cisterns placed there; but that defect would shortly be remedied. These were matters for which they must give credit to the French. Mr. Hall having explained, by a plan, the course of the intended aqueducts, and the portion of one of them actually in course of execution (the water to be brought from a distance, in a direct line from Paris, of fifty or sixty miles) proceeded to refer to the comparative mortality of the two capitals. Mr. Tite's argument, in his address in 1861, which he (Mr. Hall) read whilst living in Paris, was that as long as the rate of mortality was so high in Paris, they could not attach much credit to what had been done there. It might surprise many persons to hear that in 1860, the mortality was very little above that of London, being only something like a quarter of one in a thousand above. Not only was the general mortality in Paris so little in excess, but the mortality among young children was actually greater in London. And it was a still more important fact, that, since the commencement of these improvements, the mortality had been diminished. It was stated, in the beginning of 1863, by M. Devinck, that shortly previous to the improvements, the mortality ranged as high as 1 in 36; and that at the time at which he spoke, it was reduced to 1 in 40, or only 25 per thousand of the living, which is little more than that of London. If this were the result of the improvements, and the opening up of wide streets and thoroughfares, he (Mr. Hall) argued that that was a great fact to be considered, and taken into calculation, and particularly so by people who estimated sanitary works as having a money-value, which was in addition to that pecuniary saving which the President had so ably shown was to be derived from shortening the distances between one point of a city and another.

Rev. RICHARD BURGESS, B.D., Hon. Member, said they had been shown most convincingly by the statements made this evening, that our metropolis was in a very inferior state, as to its streets and thoroughfares, compared with Paris; and the question now to be considered was whether anything could be done to bring it into a liveable state? If they went on as they had lately, he did not see how any one could live in it. If they looked at Mr. Wyld's map, they saw a labyrinth of red lines in every direction, if half of which were carried out, it would no longer be a city to live in. The only point he had to press was, that this Institute was the very body to take up this question. To whom could people look for advice in matters of this sort but to this Institute, which comprised, he might say, all the architectural, and a great deal of the engineering talent, this country possessed. He was sure, any thing emanating from this Institute must have great influence with Parliament. The President had shewn them that if they wanted to go from one part of London to another, they must work their way through narrow tortuous streets, incurring thereby a great loss of time. The difficulties in this country were, doubtless, much greater than in Paris. They had not an Emperor to sketch out a plan and give it to his officers to carry out at once. Members of Parliament refused to make grants from the public funds towards the improvement of the metropolis; but, nevertheless, he thought when the matter was fairly brought before the Legislature, something would be done, and a plan devised for giving us those great thoroughfares which had been suggested, and which had become necessary for carrying on the traffic of this great city. All required of the Government was to obtain power from the Legislature to make direct communications from one part of the metropolis to another, according to a general plan; and such powers being obtained, the works might be given to what the French call "adjudication;" and he believed that among our speculating gentlemen, who want good interest for their capital, there would be found many to compete for the works, who, except where the nation evidently derived some advantage, would ask for no grant at all from Parliament, as the remodelling of the streets, with railways underground, would reimburse and benefit the company which might gain the adjudication. But be that as it might, he conceived the time had arrived for saving the metropolis from becoming a mere labyrinth of railway cuttings and viaducts, with bridges to pass from one side to another. This was a question also which affected the sanitary condition of the metropolis, while as to any street magnificence or architectural beauty, these points seemed to be not even considered. He hoped the resolution proposed this evening would be carried unanimously; that a committee would be appointed, and that the whole matter would be taken up; so that the whole of London should be brought under the control of a Royal Commission by the Government and the Legislature, and he could not but think great good would come out of it. He thought this Institute should show itself the proper body to suggest improvements.

The PRESIDENT having, at the request of Mr. J. W. PAPWORTH, Fellow, again read the resolution, the latter gentleman said, that while heartily agreeing with most that had been said on the subject, it seemed to him the better action would be to take a step beyond what was proposed in the resolution just read, by empowering the Committee to receive the suggestions of various individuals, and from those to select such as in the opinion of the Committee might be put into Classes 1, 2 and 3, and to submit them at once to the Government or the House of Commons in support of the grounds on which the Petition or Memorial was based. All were agreed that new streets and lines of communication were wanted in London, and this Institute was undoubtedly the proper body to offer practical suggestions on the subject. He hoped that the Committee would sit to receive such information, as it would probably save a whole session of Parliament, because committees of the House would have to settle immediately the question of these metropolitan railways, and otherwise all this Institute could do would be to say, when all the evil was done, "We tried to prevent anything being carried out with regard to these railways until the general question of metropolitan communications had been considered and determined upon, but that was all we did." He moved that the Committee should be directed to receive evidence as to desirable lines, and suggestions conveyed by plans.

Mr. C. F. HAYWARD, Hon. Sec., remarked that there was one point particularly in connection with the subject under consideration which had not yet been touched upon, he therefore ventured to say a word or two on it: but would remark first that the question of metropolitan communication was one which widened the more they looked at it, and comprehended more than at first sight appeared. The want of improved communication in London had arisen from the peculiar local government, or rather want of it, in the metropolis; while local vested interests had always interfered with any grand improvements. One of these private privileges was most extraordinary in the present age of public progress. It seemed almost incredible that in a great city like this, where direct communication from one part to another was such an acknowledged necessity, a series of private barriers should have been allowed to be placed upon the property of some noblemen and certain other large proprietors of building land, to interrupt the traffic through the streets and squares, which had been laid out apparently for public use, and which were maintained, partially at least, at the public expense. Through most of these obstructions, which had been erected within the recollection of everyone present, they could only pass by permission of the owner of the property, and awaiting the pleasure or convenience of the appointed guardian. This seemed to him a crying evil, and one which ought never to have been allowed at all. When they talked of the necessity of opening up a direct communication between the railway stations and other parts of the town, let them look at the position of one of the most important termini—that of the London and North Western Railway, originally only the London and Birmingham, but now a series of railways concentrated at Euston Square, to which might now be added the Metropolitan Station at the end of Gower Street. It seemed proposterous that the governing bodies of London should have permitted streets to be built in direct communication with this important point, and at the same time have allowed barriers to be placed in those streets, which prevented the very improvement in the way of accommodation for the traffic for which streets were formed. How was it possible to get to Euston Square conveniently from the Strand except through these "No thoroughfares, except by leave?" The only real public communication from the south-west at present was by Tottenham Court Road, which on that account was the more often required to be stopped up for repairs. Gower Street would be a substantial relief to the Euston and Hampstead Road traffic if it were a thoroughfare, and if it had been so it would probably have become by this time much less dreary than at present, and far more valuable in a pecuniary point of view. Most of the other streets eastwards in that neighbourhood were passable only by permission, though he might observe that with regard to the other great line running from Holborn through Russell Square and past St. Pancras Church, really a most important one, and one of the most direct in the metropolis, this permission was *not* given; while at the very entrance to the railway station, the direct route was barred by a triple row of iron gates, lest the sanctity of that dingy side of Euston Square should be disturbed. The St. Pancras gate was churlishly kept closed, and cabs made to turn back—even the other day, when all the rest of the streets were under repair, and when it was literally the only direct avenue by which the station could be reached. Looking at this state of things, he would suggest considering whether some means could not be devised whereby such public nuisances might be got rid of.

The Rev. Mr. BURGESS observed that an Act of Parliament could knock them all down.

The PRESIDENT remarked that this was one of the points to be considered by the Committee and embodied in the Petition.

Mr. HAYWARD continued—This point was the more important, as it involved no expenditure of large sums of money in the purchase of property, or the making of new streets, but simply the doing away with the gates, which ought never to have been erected, and which ought at least to follow the abolition of the toll bars next July, which had long remained a standing disgrace to the management of London, and one which it had required years of agitation to remove. With regard to the straight lines of streets to which Mr. Hall had alluded, he could not agree that it was always desirable to have the line of communication exactly straight, though it ought certainly to be as direct as possible. Nothing was more monotonous than a mile or two of parallel walls, as was evident even in the new Parisian improvements. He did not think there was any advantage at all in these long vistas, and he preferred the system prevalent in this country of easy curves where necessary; only let them adopt those broad lines of communication, with here and there those noble areas, and squares, or "*places*," such as they saw in Paris, which helped so greatly to make up the magnificence of that city. He entirely agreed with Mr. Hall in the economy of removing large masses of public buildings, such as the building mentioned, Coldbath Fields Prison,—that stood in the way of any improvements. It would be a blessing to those establishments themselves to be removed, and it would be profitable to utilise the space for other purposes. Again, there had been great talk about the want of suitable localities for habitations for the poorer classes in the metropolis. That want, he submitted, was easy to be met. In certain portions of the east-end of London they found miles of streets and acres of land covered with miserable little two-storied dwellings, which hardly deserved the name,—not merely miserable in the sense of being dirty and dilapidated, and wanting proper sanitary arrangements, but miserable also as to their size, compared with the area occupied by them and the vast necessities of the case. There were acres of property in London which could accommodate ten-times the amount of the present population located upon them, and, in point of sanitary considerations, become a thousand-times better, by improved buildings being erected upon a proper and well considered plan, and on a sufficiently extended scale. This also was a point to which attention must be given in considering the question of public improvements in London. A remark made by Mr. Hall as to the waste districts in Paris, now converted into something very different, would very much apply to what he (Mr. Hayward) had been describing. There were similar districts in London, where the same kind of improvements, or that especial one he had mentioned, could readily be carried out, and he might point to the spacious model lodging houses built by Miss Burdett Coutts in Spitalfields,—a district which could be made to accommodate, as he had observed, at least ten-times the number of the present population, with very great advantage to all parties concerned.

Professor KERR, Fellow, said he was fully prepared to support the proposal of the President, and to second it as a motion if necessary. At the same time he agreed with Mr. Papworth, that if it were understood that the proposed Committee had power to take evidence, it might be an advantage. During the interval before the meeting of Parliament the Committee might then be enabled to reduce the idea before them, not perhaps to the form of a definite scheme of operations, but certainly to that of a well digested proposition to submit to the public and to Parliament. Another thing that occurred to him was, that the Metropolitan Board of Works would probably have an influential voice in the question, which the Committee ought to bear in mind. As for the incomprehensible network of lines which represented the projected railways on the map before the meeting, it reminded him, as it would many others present, of the state of things at the period called the Railway Mania. At that time Parliament had been confessedly bewildered by the complexity of the situation. Line after line was sanctioned individually and at random; and then, when the mischief appeared, a loud outcry was made in Parliament itself because the railways of England had not been collectively dealt with. The present situation with regard to London was exactly the same as the former one with regard to England at large; and if Parliament had not the firmness and good sense to take up the question now as a whole, the same outcry would be raised again almost more seriously than before. A singularly good opportunity, therefore, had arisen for Parliament, the Board of Works, and all others interested in the improvement rather than the injury of the metropolis, to deal with this important question carefully and cautiously, and the Institute would certainly do well to take its proper part for the public good.

Mr. EDWARD HALL wished to explain, with regard to the objection taken to long vistas, that he only defended the lines as allowing the readiest means of getting from one part of the capital to another. It was important and indispensable that they should be able to get in the shortest time from one locality to another; but as a point of art, he admitted, and indeed contended, that the monotony of very long lines should be corrected by circuses, by bringing forward and setting back the buildings, and by other arrangements conducive to variety.

Mr. JOHN P. SEDDON, Hon. Sec., said that in his opinion it was an extremely clumsy proceeding, to say the least of it, to carry a new street in a perfectly straight direction and perfectly level, ignoring all the irregularities of the natural site and the buildings which lay in its way. The consequence of such a course must result in the monotony which had been so justly complained of, and which was so painfully observable, according to his judgment, in Paris. There might have been a practical necessity for doing so in that city, but it was surely needless and to be avoided in London, where there was no occasion to provide for problematical artillery practice. It seemed to him that the best plan was that which common sense would appear to suggest, namely, laying down a comprehensive scheme, with streets as straight as circumstances would permit, but taking advantage of and improving the accidental irregularities which would constantly occur, and making deviations and curves to avoid extant buildings of interest; and that such would not only be productive of greater picturesqueness and beauty than that which had been adopted in Paris, but fortunately was the only practicable plan in a country unblessed with a despotic government.

Mr. FREDERICK MARRABLE said, like most other great evils, this evil of the multiplicity of Metropolitan Railways would, he apprehended, cure itself. The great number of schemes before Parliament would compel the Government to deal with the matter as had been proposed in this room. He believed the engineers of the various projects were fully aware that there was little likelihood of these schemes being passed in the next session; but that Parliament would throw them all into one committee-room, and propose a Royal Commission, to deal with the question of metropolitan communication as a whole, in the way that was suggested by the learned President this evening. He believed that in this respect this Institute might render some assistance. They knew that, as regarded the Railways at present projected, there were three or four conflicting schemes for effecting the same objects, designed by different engineers. It was a race between engineers who should be able to bring the best evidence and provide the largest amount of capital in laying their plans before the Committee. He repeated he thought that was an evil which would effect its own cure: and he did not anticipate any serious difficulty in this matter in the ensuing session. With respect to metropolitan streets, he did not see why Government should not compel the demolition of the barriers on private properties alluded to by Mr. Hayward. The Duke of Bedford had consulted his own advantage in this respect rather than that of the public, and had fenced his property round and kept it to himself. He (Mr. Marrable) did not see any good in it. The Duke of Portland had done the same thing in some few instances, as also the Marquis of Westminster. Almost all these magnates had retained the power of excluding the public from their property when they thought fit; yet these were public streets, the paving and lighting of which were paid for by the parish in which they were situated. [The PRESIDENT said he thought not in the case of the Marquis of Westminster.] It was quite certain that the public good ought to be consulted rather than private interests, and all these barriers on private estates ought to be done away with, and the Rebeccaites, by legitimate agitation, might usefully employ themselves in the demolition of these gates. With regard to dealing with these matters in London in the same way as in Paris, he did not think they had the capability for doing so. In the first place, they could not persuade the Government to grant large subsidies. The Government itself was comparatively powerless; Parliament managed these things, and country members would not grant money for metropolitan improvements exclusively. He questioned both their judgment and their policy, because the metropolis was open to all England, and provincial people made use of it in their turn. Then again, London was called the capital of the world; more foreigners came to London than to any other city in the world, and therefore it should be a point of national pride that London should in all respects be equal to any other city. They had much to contend with before they could hope to get the funds for these great improvements; but when the country members of Parliament declared that they would not sanction aid out of the national purse, they should at least be just and not take money from the metropolitan purse and put it into the national exchequer. There were many causes which tended to drain the purse of the Londoner. The cabs and omnibuses tore up the pavement of the streets, and those vehicles paid a heavy Government duty, which went into the national purse. If the metropolis had the exclusive advantage of that duty, there would be no difficulty in carrying out all the improvements they required. Parliament had yielded rather grudgingly, and for a limited number of years, the coal duties for the purposes of the Thames Embankment. This would enable the Metropolitan Board of Works to carry out that work without any extra taxation of the rate-payers. The tax of 9d. per ton was one most easily collected, and was as just to the poor man who bought his coals by the cwt. as to the rich man who bought by tons: in either case the remission of that tax was not an appreciable matter, amounting as it did to only 30s. to the consumer of forty tons of coals per annum. The tax was to have ceased in 1862, but it was to be continued for another ten years, and he hoped when that term expired it would be renewed for another ten years, inasmuch as he regarded it as a necessary tax to provide funds for the improvement of the metropolis. If the Government only yielded for the same purposes the London cab and omnibus duties, they would have an additional fund of £300,000. which, judiciously expended, would go a long way in effecting the necessary metropolitan improvements. Other local duties might be yielded for the same purpose, which came directly out of the pockets of metropolitan indwellers, and might fairly be applied for their benefit, instead of being swept into the national purse. With regard to the removal of large public buildings standing in the way of street improvements, the instance of such a building as Coldbath Fields Prison had been mentioned: but he would take the case of such a one as St. Thomas's Hospital, the trustees of which had a right to say, "If you touch us you shall take the whole of the property." There was an enormous expense attending that, out of which they could only get a very small return. If they had a large piece of vacant ground, it was a long time before they could lay it out, and only such portion as gave frontages to the main thoroughfare would produce an adequate return, and in the end there would be a heavy deficit. Therefore he thought it wiser, if a large public institution stood in the way, to lay out the line so as to avoid it. Long vistas of streets were to a certain extent good, but when carried to an unlimited one he thought them objectionable, as, unless relieved by churches, or some other large buildings, there was nothing to rest the eye upon. In laying out such a street as Regent Street it might be varied by circuses, crescents, or squares, but a street going in a straight line, as in many instances in Paris, without anything to break the vista was, he thought, objectionable. He preferred a gentle curve of the line at some points—nothing was so wearying as travelling for a long distance on a perfectly straight road; they passed the mile-posts without variety, and there was nothing to break the monotony and tedium of the way. With regard to a general and comprehensive plan of metropolitan improvements, these must, in his opinion, be met as circumstances arose to lead to them. It might be well to have a general plan in view, but he doubted whether any such plan would ever be realized as a whole. Sir Christopher Wren laid down an admirable plan: how much of it had been carried out? Scarcely any, if any. There was extreme difficulty in an Institute like this laying down a plan which would be approved of by a governing body. They would always have their own say in the matter. At the same time, the Institute might render valuable assistance, and he would not throw cold water upon the proposition which had emanated from the President. It might be useful to have an expression of opinion from the Institute; at all events, it might have the effect of suspending a great many of the insane railway schemes now before the public.

The PRESIDENT said, with regard to Mr. Marrable's observation, what they had now to determine was the general principles, and not the details of the plan. They must endeavour to persuade Parliament not to allow the various railway plans to be presented till the legislature had agreed upon some general system of improved main arterial thoroughfares in London. If they were to submit any definite plan of their own, they would undoubtedly fail of their object, for great differences of opinion might reasonably arise on their scheme, and they might at once be met by objections to it. He agreed with Mr. Hayward that the barriers erected upon private properties were to be greatly deprecated. In his own case, living in Russell Square, which was subject to the condition described; having to go by a circuitous route he had sometimes been almost too late for a train. Then he would say, with respect to straight lines of streets, that travelling along high roads in the country to the extent of two or three leagues would be wearisome; but in speaking of streets, which must necessarily be of restricted length, they did not talk of leagues. Oxford Street and Piccadilly were grand lines. In the town of Lyons the Rue Impériale, which had within a few years been pierced through it, was broken by gardens and squares, the whole having a most magnificent effect, and that, which was formerly a poor and rudely built city, had been rendered fit to be the capital of a great empire. He thought it desirable to have these straight lines of thoroughfares as much as possible relieved at intervals by squares, circuses, churches, and other public buildings, which would deprive them of monotony; for the great idea in all capital cities was to get as straight lines of communication as possible, varied by monuments of some kind on either side. With respect to subsidies, he considered it a great point to be looked to, not for London alone, but for large provincial cities, to induce public improvements, as at Liverpool, Leeds, Birmingham, &c, indeed he thought they should be extended as far as possible all over the country, so as to induce general improvements even in small towns, and he believed the return would be equivalent to the outlay. The £ 300,000. per annum, spoken of by Mr. Marrable, would be a very small modicum towards carrying out the necessary improvements in London, for the amount annually expended must be much greater than that, and the work must be commenced at once. The difficulties were daily increasing, and unless the existing vacant spaces were secured they would soon be covered, and the difficulties of carrying out any general scheme would be greatly enhanced, so that it could only be effected at the greatest cost and in the most extravagant way. He therefore hoped the Meeting would adopt the general view of the case which he had pointed out, leaving it to the Committee to make such suggestions as might occur to them, when they came to consider the question.

The PRESIDENT the put the resolution, which was agreed to unanimously.

The Meeting was then adjourned.

ON HYDRAULIC LIFTS.

By John Whichcord, F.S.A., Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, January 18th, 1864.

The subject to which I have the honour to invite your attention this evening may, from its title, appear at first sight rather to concern the Civil Engineer than the Architect. But even were it so, I conceive it to be of the highest moment that we, who from our profession should be able constructionists as well as artists, should be as well acquainted with the laws relating to statics and dynamics as with the canons of taste; and that it is of the highest importance that we should keep ourselves informed as to every scientific discovery, as to every power that modern research may develop, and as to every convenient or ready adaptation of the same; more particularly those which may affect the soundness and economic construction of buildings, and the comfort and convenience of their inhabitants.

Hydraulic power, applied to edifices, is calculated to make a complete revolution in future building operations. One primary difficulty exists at present in London, namely, the deficiency and the want of elevation of the public water supply; but it is in the anticipation that this will be amended before long, that I think it desirable to direct the attention of the Institute to the subject before us. Every one knows the enormous value which land has reached in this metropolis, and whoever reflects on the wholesale destruction threatened in all parts of it, must feel that day by day the space left near our great centres of business must become of much greater worth; and that we shall ultimately be compelled, as is the case in the fortified cities on the Continent, to seek that room upwards, which it is impossible otherwise to obtain. The objection to this course we all feel to be the labour, entailed on the occupiers of tall houses, of climbing wearily stair after stair till they reach their destination; but the evil does not rest here, for medical men report that peculiar diseases are induced in servants and others who constantly have many stairs to ascend, by the unnatural exercise of their limbs.

By the apparatus I shall venture to explain, this objection may be obviated, almost entirely, without any manual labour whatever. For instance, a whole family, with all their paraphernalia of luggage, enter a small room, which, on simply opening a valve, ascends by that gigantic yet most manageable of all powers, hydraulics, slowly and safely, and lands them at any height, however elevated, on a level with their own apartments. What the locomotive has been to the traveller, the hydraulic lift will be to the dweller in elevated stories; and it is not unlikely that a contrivance, so simple and yet so inexpensive in working (manual labour is unnecessary) will hereafter be found in every moderate sized private house.

The extraordinary notions which prevail as to the knowledge, or rather ignorance, of the ancients of everything relative to water power; the popular error that neither the Greeks nor the Romans knew that water confined in pipes would rise to its own level, and the general misconception on the subject, induce me to allude, very briefly, to the hydraulics of the ancients. To dispose of the first fallacy is easy. Not only in Herculaneum and in Pompeii have complete series of lead service pipes been discovered, for delivering water to fountains and cisterns exactly as in the present day, but they were found long before in Rome itself. It seems inconceivable to any classic reader, with such a story before him as the well-known one of Pyramus and Thisbe, that the misconception should not have been dispelled. The poet, Ovid, likens the spurting of the blood from the wounded man to the jet of water issuing from a defective lead pipe. His words are (Met. iv, 121):

. . . " Cruor emicat altè;
Non aliter, qùam cùm vitiato fistula plumbo
Scinditur, et tenues stridente foramine longè
Ejaculatur aquas, atque ictibus aëra rumpit."

Well known as this passage is, grave scholars have contended that the ancients were ignorant of the first principles of hydraulics. We have also in Vitruvius one whole book (the 8th) dedicated to the subject of water and water works. In the seventh chapter he not only shows how water may be conveyed by constructed or "built-up" culverts, but by leaden pipes, and (what we conceive to be a modern invention) tubes of pottery. He shows how to take the various levels necessary for the purpose by two instruments, the "dioptra" and "chorobates," and also how water may be made to descend into a valley, and ascend again, and how to fix, in the culvert, stand pipes, "columnaria," to allow the escape of any enclosed gases (spiritus). His tenth book treats of water wheels, the screw of Archimedes, and, more than that, the force pump of Ctesibius. The greater part of these matters have been explained at length in the Dictionary of the Architectural Publication Society under the various heads.

I will not dilate on this part of the subject, but I cannot refrain from dwelling a moment on the curious treatise by Hero of Alexandria on Pneumatics, brought to my notice by our fellow Mr. Ashpitel. Although it is entitled as I have stated, it contains several curious and valuable experiments on hydraulics. Among them is one showing "How to open the doors of a temple by fire on an altar," (a very lucrative trick probably for the use of the pagan priests). Pipes filled with water were conveyed through the body of the altar to the hollow on the top where the fire was made, and thence to a species of piston which acted on rollers, round which were cords connected with the doors, and concealed beneath the pavement. As soon as the offerings were made, and the fire kindled on the altar, the water of course expanded by the heat, and the doors of the temple opened slowly of themselves without a visible hand or the action of the wind, no doubt to the great awe of the votaries: this is actually a steam crane, and probably the oldest example of that machine.

In the middle ages the study of hydraulics seems to have been entirely neglected, and except occasionally for the supply of a conduit or a fountain, no attempt appears to have been made for the distribution of water. The houses in cities were scantily supplied by their water-bearers with "tankards" as late as the days of Ben Jonson. Soon after, however, the works of the New River were commenced, and hydraulics became a most important theoretical as well as practical study; and about the same period the curious work of Böeckler was published in Germany, and later that of Bélidor in France.

Cranes, lifts, or hoists, have been worked by means of many different agents or prime movers, and have been used for a great variety of purposes. Although many of these scarcely come within the scope of the present paper, yet, as the same principles may be applied to the working of all hoisting machinery, it is thought desirable to allude shortly to them.

The earliest form of machine was the winding barrel, or drum (the "tympanum" of Vitruvius) turned by hand, fixed either directly over the weight to be raised, as in the case of a well bucket, or with a rope passing over a fixed pulley; and to this simple form was added a swinging arm or jib, which allowed of the weight, when raised, being swung to a different position before being lowered down. For a long period manual power was the only force used, but in many occupations—for instance, in coal mining—it became necessary to adopt some cheaper and at the same time more powerful agent, and horse gins, whims, or whimseys, were constructed for the purpose, not only of raising minerals, but also water, by buckets, for the drainage of mines and quarries. In most cases the horse walked round in a circle, and turned a large drum or barrel, round which the rope or chain was coiled; but sometimes the animal was made to walk inside a large wheel, the surface of which moved from under him as he stepped forward, thus compelling him to hard labour of a very similar kind to that of prisoners on a treadwheel. The intelligent proceedings of the donkey raising water from the Old Well at Carisbrook Castle are doubtless familiar to all. The large wheel is erected in a house built over the well, and on its axle is fixed a pulley, over which passes a chain, to each end of which a bucket is attached, one being at the bottom of the well when the other is discharging its contents into the cistern at the surface. As soon as the donkey is brought from his stable, he deliberately steps into the wheel and sets to work to draw up the bucket from the bottom, and as soon as he hears this emptying the water into the cistern he turns round and goes the other way, thus making the wheel revolve and draw up the bucket, which has just descended and which has now become filled: and so he proceeds until the cistern is full and begins to run over, when, of his own accord, he steps out of the wheel and walks back to his stable. Another familiar application of this power is the common horse run, for lifting barrows of earth in the formation of embankments, or materials to the top of a building in course of construction. In this instance the horse's strength is applied directly to the drawing of the load, there being no occasion for multiplying gear. There might be some cases in which it would be advantageous to work lifts by means of horses, where water or steam power was not available, but, as a general rule, neither this nor manual labor is of much service in the present state of mechanical knowledge.

Winding apparatus has also been worked by wind power, as in the common hoisting tackle in a windmill; but, from its uncertainty, this agent can never be employed to much useful purpose.

In the mines of Germany, so long ago as the beginning of the sixteenth century, water-wheels were employed for raising ore; these were either single wheels, or with a double row of buckets set in reverse order, which enabled the motion to be changed more expeditiously and with greater safety in lowering or raising the corves or buckets alternately. Such a double waterwheel was erected at Walker Colliery, near Newcastle, by Smeaton, in 1778, the drum round which the rope was wound being fixed directly on the water-wheel shaft. This kind of power is still very extensively used in Wales and Cornwall, where water is plentiful and great falls are easily obtained. It is very seldom, however, that water applied in this way can be useful for the architect's purpose, except in warehouses attached to corn mills, or manufacturing premises situated on the banks of a river with a rapid current.

Another way of applying water power for lifting is exemplified in the water-balance machines, which are very extensively used in the Welsh and other iron works, both for raising coals and ore from the mines and also for discharging them at the mouth of the blast furnace. The apparatus consists simply of a large pulley or drum, standing directly over the pit's mouth, over which passes an endless chain or rope, to which are attached two buckets, or rather tanks, one on each side, on the top of which are placed the waggons to be raised or lowered. A brake wheel is attached to the drum or pulley, so that the workman may stop the machine at any moment, or check the speed of its ascent. The tank and waggon at the bottom being of the same weight as that at the top, and the chain being endless, the whole is in a state of equilibrium, and the motion is produced by filling the upper tank with water sufficient to overcome the weight of the loaded waggon, which, upon the brake being released, rises to the surface. The water is let out of the tank on reaching the bottom of the shaft, and, on the waggon at the top being unloaded, the whole is again in equilibrio and ready for the repetition of the process. This is a very cheap form of lift, where plenty of water is at command, and there is the means of free drainage at the bottom; but it is open to the objection of being dependent for safety upon the brakesman, as the velocity, unless checked, necessarily becomes accelerated at each foot of descent, in accordance with the law of falling bodies. Water-balance lifts have also been extensively used in the working of canals, on precisely the same principle as that just described, the only essential difference being that the barge takes the place of the waggon. It has been attempted to apply this principle to the class of lifts required in hotels and warehouses, but in consequence of it being necessary to have the power of stopping at different floors, and sometimes of changing the direction when half-way, the difficulty of managing the supply of water to the tanks, and the time lost in opening the different valves for regulating the exact quantity of water necessary for either ascent or descent, have put this form of lift quite out of the question. Another (but a very rude) description of balance lift in use in some manufactories consists simply of a chain or rope passing over a pulley, to one end of which is attached the cage containing the weight to be raised, and to the other a counterbalance weight sufficient not only to bring up the cage but also the heaviest weight that is ever to be placed upon it. The speed of ascent is regulated, as in the last instance, by a brake, and the safety of the whole is thus entirely dependent upon the skill and coolness of the men in charge. In order to bring the lift down again, it is of course necessary to obtain from some quarter a weight sufficient to overcome the counterbalance, and, unless it should happen that sufficient goods are ready for lowering, this cannot be done without great waste of labour. The ascent and descent are also assisted by the man inside the cage pulling at the endless rope passing over the pulley at the top, which is keyed on to the same shaft as the balance drum or pulley; but the additional power thus gained is of little service where anything like 6 or 8 cwt. are required to be raised.

The introduction of steam effected a complete revolution in this as in all other branches of mechanical knowledge and practice; although it is a singular fact, that very many years elapsed after the steam engine was used for draining mines before it was applied to the raising of ore, &c. from them. This was probably, however, the first branch of industry to which steam was employed for moving weights, always excepting the opening of the temple doors before referred to; but its use was soon extended to other trades. It is now applied in a great variety of ways: in cranes, whether fixed on a wharf or in a warehouse with swinging jibs, the steam is generally used through cylinders acting directly on cranks fixed to the winding gear of the crab or windlass, the force being thus applied exactly at the same point as in the case of hand cranes. Sometimes, however, the steam is made to act directly on a piston and rod, to the end of which the chain is attached, so that the pressure of steam raises the weight without the intervention of any gear-work whatever, and is thus analogous to the force exerted by the horse in the common horse run, before alluded to. Direct-acting cranes on this principle have been erected at Lowestoft for the discharging of colliers, and are found very efficient for a short lift. A modification of the same crane was constructed by Mr. Morrison, of Newcastle, for the same purpose, in which the wire rope itself was made to act as a flexible piston rod, being attached directly to the piston.

But besides the direct application of the steam engine to the crane just described, there are a number of methods of transmitting the force, either through shafting and gearing, or through the pressure of air or water produced by pumping. And this brings us to what is more directly the object of this paper, —the appliances hitherto alluded to being of greater use to the railway or dock engineer than to the architect, who has seldom to provide for the raising of weights exceeding 15 cwt. to 20 cwt. at one time.

The most common form of hoist is that known as the Manchester or Lancashire teagle, which can be applied to any part of a building where power can be obtained from a lay shaft used, it may be, in connection with the particular branch of manufacture—as, for instance, in a cotton mill. This machine consists of a winding drum or pulley, over which a rope or chain passes, to one end of which is attached the cage or room, and to the other a weight, which is generally made sufficient to counterbalance not only the weight of the cage but also half of the load, so that, whether the cage is ascending or descending, the power exerted by the apparatus is pretty nearly the same. The winding pulley is made to revolve by means of gearing driven by straps on the lay shaft before alluded to. This gearing consists of three riggers or driving pulleys, two of which are allowed to run loose on the shaft of the hauling drum, and the third is keyed on, so that, when either strap is on the third pulley, the machine is in motion. The action of the lift is reversed or stopped altogether by the attendant in the cage pulling a rope, which acts upon a lever and throws either strap on to the fast pulley, or allows them both to run on the two loose pulleys, in which case, of course, the lift stops. The same movement, which throws the straps on to the loose pulleys, also puts on the brake, so that the lift is prevented from falling. Two ropes or chains, each sufficiently strong to sustain the utmost load, are generally fixed to these machines, and in cases where wood guides are used, a safety apparatus is sometimes adopted to prevent accident from the ropes breaking, the general principle of which is, that if the rope should break, a serrated projection is thrown out by a spring to lay hold of the timber guides. As this would not prevent the falling of the cage in case the straps or gearing should give way, or the rope slip on the pulley through the cage being overweighted, or any other accident to the machinery, a very ingenious invention was introduced by Messrs. Westhead and Barnes, and shown at the Great Exhibition of 1862, for throwing out the serrated projections not only when the rope breaks, but whenever, from any cause, the velocity of the hoist in its descent attains a limit beyond which it may be deemed unsafe to travel. It consists simply of a ball governor, similar to the common steam engine governor, fixed to the top of the cage, and put in motion by a friction roller constantly pressing against the guide upon which the hoist works. Should the hoist ever attain too great a speed, the governor immediately releases a latch and sets free the serrated cams. The greatest objection to these safety appliances is, that in an establishment where the people are not accustomed to machinery, such as a warehouse, an hotel, or a private house, the apparatus would in all probability be neglected, and through want of cleaning and oiling, or other cause, be out of order at the time when it would be most required. It is therefore generally preferred to provide for safety by having double ropes, and trusting to the attendant putting on the brake in case of accident. A great number of this description of hoist are at work in the cotton mills and warehouses in Manchester and elsewhere.

Another form of applying steam power is by a worm-wheel acting on the hauling drum without the intervention of straps; an instance of this method of driving is to be seen in the well known ascending room at the Colosseum, which was first fitted up by Mr. Easton so long ago as 1834, and was improved by Messrs. Easton and Amos some years afterwards.

Besides this description of hoist, cranes for unloading and loading goods, both on a wharf and in a warehouse, have been worked by means of a vacuum acting, instead of steam, in the cylinders of the crabs and cranes. The vacuum is produced by a steam engine and an air pump exhausting the air in a receiver, with which all the different crane cylinders are connected by means of pipes made perfectly air-tight. The cylinders are set in motion, exactly in the same way as in the steam engine, by opening and shutting valves. In fact, the engines are identically the same, the only difference being that the pistons are drawn, instead of being pushed from one end of the cylinder to the other. Cranes and hoists on this principle have been at work ever since 1846, at the premises of the South Eastern Railway at Whitstable.

Although the pressure and weight of water were used at a very early period for the purpose of raising weights in mining and other works, and the invention of Bramah's press drew general attention to the convenient application of its immense power, yet it does not seem to have occurred to any engineer to apply this principle, on an extended scale, until Mr. (now Sir W.) Armstrong, introduced his hydraulic cranes; the first of which was put up on Newcastle quay in the year 1846, and was worked by pressure from the street mains equivalent to a column of about 200 feet. The irregularity of pressure consequent upon the variable draught from the mains for house consumption greatly detracted from the usefulness of the crane; and Mr. Armstrong then invented his "Accumulator" as an artificial head or reservoir, to be used where sufficient and regular pressure could not be obtained from a natural supply without the aid of pumping power. The accumulator, so called from its accumulating and storing up the power of the pumping engine, consists of a large cast-iron cylinder, fitted with a plunger, which is loaded to the required pressure, and is connected by means of cast-iron pipes with any number of cranes or other machines. The cylinder is made sufficiently large to contain the greatest amount of water, which can be drawn from it by the simultaneous action of all the machines worked from it.

The principle of the crane itself is that of a plunger or ram, to the end of which is attached a pulley block, having two or more sheaves (used in the inverted order of blocks and pulleys), working in a cylinder, to the end of which is fixed a similar set of sheaves; the hauling chain is made fast to the cylinder itself, and passes over both sets of sheaves as many times as the total height to be raised exceeds the stroke of the ram, so that in the passage of the plunger from one end of the cylinder to the other, the cage or load attached to the chain is lifted the height required. The size of the plunger will, of course, depend upon the load to be lifted, and the amount of pressure available.

Sir W. Armstrong's system has been largely adopted in almost all the great docks and railway stations both in this country and abroad, and it is, without doubt, the very best for transmitting great power to a large number of different machines, fixed at various points over a wide area; and it has the advantage of being applicable in many places where it would be impossible to carry steam, or to obtain anything like sufficient pressure for heavy weights from natural elevations.

In smaller establishments, such as single warehouses and buildings under one roof, where very heavy goods have seldom to be moved, and where frequently the use of steam power for obtaining the artificial pressure in the accumulator is altogether out of the question, a lighter class of machinery is necessary—hence the adoption of the particular kind of hydraulic lifts now to be described. These lifts, which are all worked by natural pressure from a high level tank, can be used in any town where a good system of water supply exists; and one great reason of their not having become more general (in London particularly), is the fact, that, from various causes, the pressure obtainable from the water companies is inadequate for the purpose.

It is essential for the proper and economical working of hydraulic lifts, that a supply of water should be available at a pressure allowing a cistern, placed in or upon the roof of the building, to be regularly filled; but this is far from being the case in most towns in the kingdom, and especially in London, where principally from the overtaxing of the street mains, it is found, by most of the companies, impossible to afford a high service as above described, except by making special provision to meet each particular case. A perfect system of water works should provide in every street, or, at all events, in every great thoroughfare or main street, a main pipe, the pressure in which should always be capable of throwing jets of water in sufficient volume to put out any ordinary fire without the aid of engines. Of course, the same pressure would allow the cistern for working the lift being placed at the highest possible point in the building; indeed, the cistern might then be dispensed with altogether, except for the possible want of regular supply, arising from the water being turned off in the main, in case of repairs, or other temporary hinderance.

There are many reasons, besides those incidentally alluded to in the course of these remarks, why hydraulic power is more suitable for this class of lifts than any other; one of the strongest being, that it is always available at any moment by the simple act of opening a cock or valve, without any labour in getting up steam, so long as any water remains in the cistern. Beyond this, the entire absence of any danger arising from explosion through the neglect of ignorant or careless workmen, which forms so great an objection to the use of steam or gas, especially in establishments where skilled labour is wanting—the ease with which the machines are managed, and the simplicity of them, render them capable of being worked by any person, so that in hotels or private houses, the owners are not at the mercy of the man who has charge of the apparatus, as is too frequently the case where machinery is employed.

These machines act with the greatest certainty, in consequence of the non-compressibility of the medium; and the annual cost, with proper arrangements of service cisterns, can, as far as regards water in most establishments, be absolutely reduced to nothing, whilst the outlay for repairs, in consequence of the fewness of wearing parts, is also very small.

The uses to which it occurs to me that hydraulic lifts are more particularly adapted are the following: In warehouses where steam is not used. In public offices, for raising people, coals, books, letters, &c. In manufacturing premises and shops, for raising goods. In hotels and large establishments of chambers, for raising persons, luggage, coals, food, wine. In hospitals, for lifting patients, coals and food. In ordinary houses the want of back stairs might be greatly relieved by the use of lifts for raising coals and bulky articles, which do much damage to staircase walls and carpets.

In order to explain more clearly the precise description of lift I contemplate for the above requirement, I have thought it best to give an illustrated description of the apparatus I have adopted in my own practice, in the Brighton Hotel, a structure of considerable magnitude, and of great elevation. The lifts in question are now being constructed by Messrs. Easton, Amos & Sons. The diagrams on the walls illustrate them, and the plan of the hotel shows how they are applied to the building.

The lifts, five in number, will be used for the following purposes:—

A for passengers from the ground to the fifth or any intermediate floor, a height of 56 ft.

B for luggage, coals, linen, &c., from the basement to the fifth floor, a height of 77 ft. 7 in.

C for wine, from the cellar to the bar, 16 ft.

D for dinners, provisions, &c., from the basement to the fifth floor, for the service of all the different floors up to the fifth, 79 ft. 3 in.

E for dinners, &c., from the basement to the large coffee room, 16 ft.

All five will be worked by pressure from a cistern fixed in the tower, at the height of 124 ft. above the basement, and kept constantly full by a service from the mains of the water company: the waste water will pass into two large cisterns, placed over the lavatories on the ground floor, which will provide a supply for the whole of the ground and basement stories. By this means the lifts will be worked *without any annual cost*, the power being obtained by intercepting the water in its passage from the mains to these cisterns, whence it will be drawn for the usual domestic purposes of the establishment.

In constructing a lift for raising passengers three principal points must be attended to; safety, smoothness of working, and certainty in the action of the stopping and starting gear. I believe these requisites will, in this case, be fully attained.

Lifts A C and E are all on the same principle, acting by direct pressure precisely as is the case with Bramah's hydraulic press. The larger one A, shown by the drawing, No. 1, consists of a plunger or ram of cast iron (*G*), made in four lengths, screwed firmly together, and accurately turned to fit the stuffing box of the cylinder. The cylinder (*H*) is constructed in lengths firmly bolted together, and provided on the top with the stuffing box (*I*), the packing in which takes the place of the cup leather in Bramah's press, as being a more convenient method of keeping the cylinder from losing water when at work, in consequence of the difficulty of taking out so long a ram when the cup leather requires renewing. The pressure also in this case is not more than that upon the stuffing box of any ordinary pump; so that common hemp packing, saturated with tallow, is amply good enough for the purpose. A borehole is sunk to a sufficient depth below the surface of the ground to receive the cylinder, and this is lined in the usual way with an iron casing, so as to prevent the earth falling in upon the cylinder. This is kept in its proper position by two brackets cast on it, which are bolted firmly to the two cast-iron girders (*K K*) built into the walls on each side of the lift space. The water is brought to the cylinder through the pipe (*L*), and the waste is conveyed to the cisterns, supplying the lower part of the building, through the pipe (*M*).

On the top of the plunger (*G*) is fixed a strong cast-iron frame, forming the bottom of the ascending room, the sides and top of which are constructed of wrought-iron frame work, filled in with wood and glass, and fitted with a sliding door. On the top and bottom frames, at each side, are fixed two brass V shaped guides (*N N*), which work against two cast-iron Λ shaped guide bars (*O*) accurately planed, and bolted firmly to the walls in a perfectly straight and perpendicular line. The tops of the brass V guides are made in the form of a cup, in which a sponge kept saturated with oil will be placed, so as to lubricate the guides and guide bars every time the room passes up and down. To take off the weight of the ram and ascending room, a counterbalance is fastened to a strong chain which passes over the pulley (*P*) at the top, and is fixed to the wrought-iron ring (*R*) in the top frame of the room. The counterbalance (*S*) consists of a number of square cast-iron weights strung on a wrought-iron rod, and slides in a separate shaft or trunk, which keeps it in its proper position. All vibration and noise, which might be produced by its rubbing against the partitions of the trunk, are effectually obviated by placing between some of the weights layers of cork, felt, or other soft material projecting beyond the edges of the weights. As it is obvious that the ram in action, when out of the cylinder, weighs more than when in it (*i.e.*, that the weight of the ram, when at the fifth floor, is greater than when at the ground floor, by the weight of water displaced); the counterbalance chain (*T*) has been made stronger and heavier than is necessary simply to sustain the room, and its weight per foot is such that, as the ram rises, and the chain consequently passes over the pulley (*P*) from the side of the ascending room to that of the counterbalance, the extra weight thereby added to the latter is exactly equivalent to the increase in the weight of the ram by its removal from the water.

The water is admitted from the pipe (*L*) to the cylinder by the piston valve (*U*), which is so constructed that the flow into and out of the cylinder is managed through the same junction pipe (*W*); and between the starting valve and the cylinder there is introduced an apparatus (*X*) for regulating the speed of the lift, which is liable to variation on account of the load in the room varying on different occasions. For instance, the lift in question is capable of raising eight persons, at a given speed, which is at present fixed at sixty feet per minute, but it will frequently happen that the attendant may have occasion to go up to fetch persons from an upper floor, in which case the speed would be greatly accelerated. To obviate this defect, the regulator above referred to was invented by that eminently scientific amateur mechanic, Mr. Appold, F.R.S. It is an exceedingly simple and beautiful contrivance, consisting of a cast-iron box or chamber, through which the water passes in its way to and from the cylinder, and in which is suspended on a centre a brass quadrant, the face of which fits accurately the face of both the inlet and outlet passages. This quadrant is free to swing from side to side, and its action is as follows. When the velocity of the water, in either direction, does not exceed that decided upon, the swinger hangs in a vertical position without moving, but the instant the velocity increases beyond that point, *i.e.*, the instant the lift moves at too great a speed, the swinger rises and closes the passage to such an extent as to reduce the speed to the normal velocity, without impeding in any way the statical force of the water under any pressure whatever.

The starting valve (*U*) is put into action by means of the lever (*a*), one end of which is attached to a vertical rod (*b*), which is free to rise and fall in small cast-iron guides (*c*) fixed to the wall of the lift space. The other end of the lever is attached to the spindle of the starting valve. When the lever (*a*) is in a horizontal position, the water is shut off altogether from the cylinder, and the lift is stationary; when it is down, in the position shewn by the blue line, the inlet is open and the lift rises; when in the position of the red line, the exit port is open, and the lift descends. On the vertical rod (*b*) is fixed, opposite each floor, a small pin (*d*). These pins are not directly over each other, but are one in front of the other, like the pins in a musical box, and they project in front of the rod to such an extent as to allow of the side of the ascending room just clearing their points. In the ascending room itself is a handle (*e*) by which the attendant is able to move an upright bar (*f*), one end of which is fixed to the bottom of the room, and the other describes the arc of a circle, and slides in a groove of brass (*g*) fixed in the side of the room. On this bar, outside the room, is fixed the lug (*h*), which projects far enough to come in contact with the different pins. These pins being fixed in parallel vertical lines, it will be seen that the lug on the ascending room can only come in contact with one of the pins at once, and, if placed by the attendant opposite that pin, it will escape all the others. The brass segmental groove (*g*) inside the ascending room, in which the bar and handle works, is engraved with the names of the different floors, and an index or pointer (*i*) is fixed to the handle, so that the attendant may set the lug, outside, opposite the pin on the rod which projects at the floor indicated by the pointer. When the lift reaches that floor, the lug (*h*) comes in contact with the pin (*d*), raises the rod (*b*), and so moves the lever from the position shown by the blue line to a horizontal position, and the lift stops. To the top of the vertical rod (*b*) is attached a hand line (*k*), passing over a small pulley at the top, and then down through the ascending room to the bottom of the lift space; and to it is fastened a weight (*l*) sufficient to counterbalance that of the vertical rod (*b*). By pulling this rope, either up or down, the attendant can at pleasure start, stop, or reverse the lift. When the lift has come to a standstill, as before described, at the floor indicated on the engraved plate (*g*), the attendant will alter the position of the handle, till the index is opposite the next floor at which he desires to stop, he will then pull the rope, so as to send the lift either up or down, and the lug will again come in contact with the pin at the particular floor, and stop the lift exactly at that point. Water being, to all practical limits, incompressible, the lift is stopped the instant the water is shut off by the lever, and stands exactly level with the floor or landing. The exactitude with which this can be done is of great importance in an establishment such as a large hotel, where ladies and children frequently use the lift; as they might become nervous should the attendant, through carelessness or awkwardness in manipulating the hand line, make the lift vibrate above and below the floor. I think the description of the guides, ram, and starting gear, will convince you that two of the requirements enunciated are fulfilled, smoothness of working and certainty of action; and I shall now say a few words as to safety.

Now, what possible accident can happen to the apparatus?

1st. The counterbalance chain might break (although its proof strain is more than twenty times as much as the greatest load it will ever have to bear); but the only effect upon the lift would be to cause the extra weight thrown on the plunger to overcome the force of the column of water, which thereupon would be forced back again to the cistern in the roof, and not at any dangerous velocity, Mr. Appold's regulator keeping it at the normal speed.

2nd. The starting valve, or inlet pipe, might burst; then again the regulator would prevent the escape of the water at too great a velocity, and the lift would simply descend to the bottom, the only inconvenience being the waste of the water.

3rd. The cylinder might split, or even a piece might blow out of it; but, in consequence of the water having to pass out between it and the sides of the bore pipe, the friction would be sufficient to prevent any very great acceleration of velocity.

4th. The only remaining accident that could happen, but at the same time the worst, would be the breaking of the ram itself; but this is almost an impossibility, as before arriving at the breaking point it would have to deflect to such an extent as to effectually jam the guides against the bars, and so relieve itself of the weight, and at the same time prevent the cage from falling.

The apparatus just described will be capable of raising eight persons, averaging ten stone each (total, 1120 lbs.), and will cost, including every expense except the cisterns and pipe from them to the lift, from £600. to £650.

The lifts C and E are exactly similar in principle to A; but, from only travelling between two floors, the starting gear is greatly simplified, being merely a three-way cock with a handle and engraved plate attached, to indicate which position the handle must take, for the lift to move either up or down. Lift C will raise 50 lbs., and will cost about £75. Lift E, 100 lbs., and will cost £115.

By the side of lift A will be fixed lift B for raising luggage, which will be on a different principle. This, as well as lift E, will consist of a horizontal cylinder and piston, giving motion to rack and pinion gearing, which causes a hauling drum to revolve, and thus winds up the chain to which the cage or lift is attached. The same species of starting valve and gear is employed, so that the porter who shows the passengers to the lift can put the luggage into the cage, and set the handle to the proper mark on the index plate; and the cage will stop at the floor until unloaded and sent down again by pulling the rope. This lift will raise 600 lbs., and will cost from £400. to £450. Lift B will be of precisely similar construction, but will only raise 100 lbs., and will cost about £280. to £300.

A complete system of communication is made between all parts of the building, wherever any of the lifts start or stop, by means of bells and speaking tubes. The above described provision of hoisting apparatus will, in my judgment, serve the requirements of the large establishment in which it is introduced, and will render the service of its several parts perfect and economical, as well as obviate any objection that might otherwise be raised to the upper stories, in consequence of the number of steps leading to them.

My subject is by no means exhausted. I feel that I have omitted to allude to many other purposes to which this description of apparatus may be applied, and that as soon as it shall be generally recognized, and a more ample and efficient supply of water shall have been provided, facilities will be given for the occupation of space now almost unproductive. I have only endeavoured to bring the general subject forward in the hope that any deficiency on my part will hereafter be made good by more able members of our body; and in conclusion I would suggest that the tone of thought induced by mechanical contrivances applied to modern buildings is in the highest degree worthy of cultivation, and that the remarks of our late lamented President, Professor Cockerell, were pointed in this direction so long since as 1856, when, alluding to modern invention, he summed up his lecture at the Royal Academy in these words:—" To turn all these novel materials to the best account should now employ our ingenuity. A revolution is inevitable in interiors, and modifications in exteriors. Let us look to the daily evidences of transition, and help them with those forms and laws of taste which the architect of the beautiful is best qualified to recommend, and there need be no fear but that the builders of the nineteenth century will, in their structure at all events, exhibit abundant originality. If we labour at a competent exhibition of these novelties with all the accompaniments and law of taste, it need never be doubted that the year 1900 will display in architecture that which never before was dreamt of, characterizing the century in a manner worthy of its extraordinary progress in civilisation."

Mr. **Edward Easton**, Visitor, said that if any questions were put as to the details of the lifts themselves, and their mode of action, he should be happy to answer them. Many forms of lifts were in use and the question now before the meeting was the especial advantage of hydraulic lifts over all others. It was scarcely possible to over-estimate the importance of the application of such apparatus, whether worked by hydraulic or steam power, to buildings of the class now so generally being erected in various parts of the country, especially in London and large towns, where ground space is very valuable; and he thought it well worth the consideration of architects that they should make themselves acquainted with all the different forms of appliances which could be usefully and economically adopted. There were two or three points to which, as an engineer, his attention had been directed in the construction of the lift in question. The main point, and that which would strike all, was as to the strength of a ram of such a length as that shown in the drawing, which however was not an extraordinary length, because he believed the direct acting principle had been carried in other cases to even a greater extent. But if a little consideration were given, it would be seen that the strength of the ram itself was sufficient to support any weight that would be brought to bear upon it. In the calculation of strength, the first question to be settled was whether they should look upon the ram as a column with a flat-ended top, or with a round top. The experiments made by Mr. Eaton Hodgkinson showed that a column supported upon a flat base, and having a flat top, would bear about three and a half times as much as a column supported on a round end, and bearing the weight on a round top. This ram was, doubtless, round-ended; but as the cage was confined between two guides, so that it could not move laterally, it partook of the character of a flat-headed column; that is, the weight when out of the centre would come upon one edge of the column, and give greater resistance to bending, and therefore greater strength to the ram. In any case, they had ample strength. The ram was eight inches in diameter, and from one half to six-eighths of an inch in thickness; and the breaking weight calculated, even as a round-ended column, was nine and a half tons; and the greatest weight that could come upon it, supposing the counterbalance chain to break, could not exceed two tons. Then came the question, whether, in consequence of the ram being considered as a flat-headed column with a round base, they ought not to multiply the breaking weight by 1·75, thus making it 16·6 tons, or eight times the greatest weight that could, in case of accident, be thrown upon it.

Mr. **Alfred Smee**, F.R.S., Visitor, stated, as chairman of the Brighton Hotel Company, in whose building these appliances had been carried out, that the directors took special pains in the matter of the construction of the lifts, which had been so fully described. It appeared to the directors that the success of their undertaking partly depended upon the excellence of this apparatus. He might say it had attracted a great deal of attention, and had demanded both of the architect and of the engineer, he believed, more than usual skill. The apparatus in its present form, the directors were most thoroughly satisfied with, as far as they were yet able to judge of it. In the first place, the idea of safety seemed to be brought before them to the fullest extent. He did not know anything which gave a greater idea of safety than a room in the form there represented. The ram itself was exceedingly strong, and passing down into the ground seemed to prevent in any way such a rupture as would lead to any unfortunate occurrence. Another thing they had stipulated for was that the action of this ascending room should be perfectly smooth and without lateral or vibratory motion. This had been obtained in the most effectual manner by the guides, which acted as smoothly as the bed of a plane, and were fixed to such a nicety that he hoped the apparatus, when in use, would glide up and down perfectly noiselessly, and with a scarcely perceptible motion to the occupants of the room. Then, again, it was a matter of importance that the persons inside this "up-stairs omnibus" should not be impressed with the idea of passing objects in the ascent and descent of the chamber, and that had been effected by making the room a completely closed one, with a lamp burning inside, by which the occupants of the room would not be aware in which direction they were going; and the directors expected it would glide up and down, and be available all day long, and every day. Then came the question of the cost of working, which in this case was *nil*, as virtually the motive power—water—was obtained for nothing. The water necessary for the purpose was stored at a certain elevation, and used at a lower level, and the passage of the water from the higher to the lower elevation gave them the necessary power. The cost of that had been arranged with the Water Works Company at Brighton, on terms which he thought were fair to them and remunerative to the Water Company. They paid at the rate of a shilling per 1000 gallons for the first 1,000,000 gallons, and sixpence per 1000 for each 1,000,000 gallons afterwards. That would bring the entire consumption of water within a reasonable expense. Mr. Whichcord, in his paper, had raised the idea that this appliance was available only in certain towns. That was true to the fullest extent. At Brighton, when application was made about the water, the directors were told that they could have it in any quantity they wished for. They had an unlimited supply of water from the chalk formation, and could supply it at any desired pressure. If they compared that with London at the present time, they saw what the difference was. At this moment the supply was so short in the metropolis that there was scarcely one house in a dozen that had more than a few gallons of water in the tanks on a Sunday evening. The difficulty of obtaining water for these mechanical contrivances was a great and growing evil, and was felt universally wherever we go. The shortness of the supply of water was such that we were unable to obtain what was required for domestic purposes, much less for those mechanical contrivances which we might have in our houses if the water companies only enabled us to have the quantity we want at a fair and remunerative price.

Mr. CHARLES FOWLER, Fellow, inquired how many gallons of water were consumed in the raising of the principal "lift."

Mr. WHICHCORD replied that the ascent of ten feet of the "lift" displaced about twenty gallons of water. That water, however, was not wasted, but passed off into cisterns for the general supply of the building.

Mr. CHARLES FOWLER—The water, as I understand, can only pass out at the bottom; therefore you cannot supply any cisterns except those on the ground-floor which you allude to.

Mr. WHICHCORD said, inasmuch as there is a complete pipe, the water will rise above the point at which the top of the room may be by the pressure of the cage rising. If you put into the room one or two persons more it will drive the water higher again into the cistern. In this case it drives the water not only to the top of the room, but to the story above it for the supply of the closets; therefore we make the room half an inch bigger in dimension to make up the extra velocity to drive the water into the cisterns on the floor above. The water does not run away from the ram, but rises above it.

A MEMBER asked whether the counterbalancing weight was equal to the whole weight of the chamber, or what was the amount of the counterpoise.

Mr. EASTON replied it was equal to the weight of the chamber and that of the ram in the water. The weight of the ram was greater out of the water.

Professor KERR, in proposing a vote of thanks to the author of the paper, said the introduction of the hydraulic lift into buildings of a domestic character was an interesting question to the architects of the present day,—one of those matters which might involve future modifications of plan. At present, however, so far as architects were concerned, it was simply a question of money: to raise a certain amount of weight to a given height required the expenditure of a certain sum of money,—in this particular instance, taking the form of so much water supplied at a certain altitude at a certain cost. The gentlemen interested in the Brighton Hotel were anxious to explain that the water in their case really cost nothing—that was their main point. In other words, so far as regards the use of it for the purposes of their lift, it was said to cost them nothing. The water was delivered at a high level to be used at a low level. After having served the purpose of working this moveable room, the water was only at the level required for other purposes. This arrangement, however, would but seldom be met with. A great mass of water delivered at a very high altitude, to be used at a very low altitude, could scarcely be had in London, for example. Nevertheless, he congratulated the designers of this apparatus upon their success, and he hoped their calculations would be fully borne out in working.

Mr. C. F. Hayward, Hon. Sec., remarked, to bring the matter to a practical point they must calculate what was the cost of the water used in lifting the room from the bottom to the top, supposing all that water to be wasted. As regards the lifts for passengers in hotels the cost might be calculated at so much per journey; and in some places, as a matter of economy in this respect, gentlemen were requested to wait till there was a sufficient complement of persons to send the room up, consequently they were not so frequently useful as they otherwise might be. At the Grand Hôtel in Paris he could not get a journey up by the ascending room at all. The cost at some hotels was calculated at a penny, or something less, per journey, which though small in itself, yet when multiplied by the great number of journeys made in the day with luggage and other things, and carried on continuously from day to day, made a considerable item at the end of the year.

The President thought manual labour would be much more costly.

Mr. Easton said with regard to the cost of the water in these matters, hydraulic lifts, though not exactly the same as in this case, had been at work in hotels for a long time. At the Grosvenor Hotel lifts had been in operation for a year and a half, the principal one being 110 feet in height. The total cost of the water supply of that hotel he believed did not exceed £200. a year, and of that amount about £50. was put to the debit of the lift, which was owing to the arrangements at the lower part of the building not having been perfect for the utilisation of the water used in working the hydraulic apparatus of the lift. It was all wasted, but arrangements were now being carried out for using the greater portion of that water within the establishment. With regard to the lift not being always accessible to visitors at the hotels, he believed in the case of the Grosvenor it was used at any time, and for every person who wished it. In the Grand Hôtel he believed the apparatus was worked by a gas engine.

Mr. C. F. Hayward would like to know, independently of the question of utilising the water afterwards, what was calculated to be the cost of a journey in ordinary cases. Armstrong's hydraulic lifts were used in the granaries of the Great Northern Railway, and elsewhere. They took up so many sacks at a time, and delivered them on the different floors. If the corn remained in the granaries any considerable time the cost would be comparatively small, but if the cargoes of corn were shifted very frequently it became a great item of expense.

Mr. Easton remarked in the case of the great Northern Company the lifts were worked by Armstrong's apparatus with the accumulator. That did not put the case in a fair light. Take the case of this particular room, from the ground floor to the top floor, the discharge of water would be about 100 gallons per journey, which at an average of ninepence per 1000 gallons would be about three farthings, assuming the water to be wasted, which it was not. At the Grosvenor they made about eighty journeys per day on the average, the cost of which was about 6½d. per day, calculating each journey at three-eighths of a penny.

Mr. Smee remarked that the real cost was that of raising the water from the lower level to the upper cisterns, a height of 90 feet, which would be equal to about one-tenth of a penny per journey from the bottom to the top.

Mr. J. W. Papworth, Fellow, in seconding the vote of thanks to Mr. Whichcord, remarked that the employment of lifts resolved itself into two classes, viz., for warehouse and for domestic purposes. The question of danger in warehouses was met within certain limits; but, on the question of domestic use, he did not see any way of assuring the majority of persons who were timid that there was no danger of the whole cage coming down suddenly from top to bottom. Mr. Appold's regulator was certainly a happy invention, and was calculated to set the mind at ease upon two of the probabilities of accident, but a third remained. The great difficulty, he thought, was to persuade persons to use such apparatus when it was provided; he thought most persons would use the stairs in preference; and he did not anticipate that within his own time he should hear of staircases being superseded by these lifts. The loss of the counterbalance weight, and the fracture of the piston, seemed to be fully compensated for by the regulator spoken of; but what would be the result if the cylinder below the regulator burst, and what would be the probable cost of such an accident?

Mr. Whichcord replied, that in the very improbable event of any rupture of the cylinder below the level of the ground, the water could not rush out very quickly, because of the iron casing enclosing it.

The vote of thanks to Mr. Whichcord having been passed unanimously, the meeting adjourned.

A DISCUSSION

Upon the Paper read at the Ordinary General Meeting of the Royal Institute of British Architects, Nov. 30, 1863, by F. C. Penrose, M.A., Fellow,

IN FAVOUR OF THE DECIMAL BUT AGAINST THE METRICAL SYSTEM OF MEASUREMENT,

At the Ordinary General Meeting of the Royal Institute of British Architects, February 1, 1864.

The President, Professor Donaldson, announced that the discussion on Mr. Penrose's communication on decimal weights and measures would now take place.

Mr. F. C. Penrose, Fellow, said he would only add to his former remarks on this subject that he wished to be understood not so much as an advocate for the change of our present system as for the due consideration by the Institute of the best form and direction which should be given to the change which appeared to him sooner or later to be inevitable; and he would observe further that his main object was, while advocating the decimal to avoid the metrical system, which he thought undesirable for many reasons, stated by him on the former occasion. Two plans were proposed; one the use of the decimal foot, which had much to recommend it, and the other that of making a slight change in the foot which would then become the measure, which for the sake of being more readily understood he had designated the "span," a specimen of which he would hand to the President. It was the ordinary drawing scale of $\frac{1}{8}$th of an inch to the foot. It differed (with scarcely appreciable error) five per cent. from the third of the metre, and 5000 such spans would make a mile, and 200 would make the side of a square acre, and 70 such miles would be exactly a mean degree of latitude, so exactly that such *degree* would not differ in latitude 45° by so much as the length of the table in front of the President's chair. These were considerations which afforded in his mind plausible reasons for its adoption. The main thing, however, was to get a decimal system; and, secondly, to avoid being saddled with the French metre.

Mr. White, Fellow, was glad to find that Mr. Penrose had somewhat modified his views as to a *wish* for change, and he thought Mr. Penrose was one of those best entitled to speak upon such a matter, though he could not agree with his conclusions. He (Mr. White) did not think that the House of Commons, by its second reading of the Bill, introduced into Parliament on the subject last year, intended to adopt the principle that the change was desirable, but only to allow of the principle being discussed: nor did he think that the Institute was, or ought to be, "committed to a change," merely because the Council had petitioned, without giving the general body the opportunity of expressing an opinion. The subject consisted of two parts, viz., Uniformity of System and Decimal Computation And these must be kept quite distinct in discussing the merits of the case. Uniformity was most desirable,—uniformity not with foreign nations, but amongst ourselves. General uniformity, whether of system or of standard, with foreign nations was utterly unattainable, for scarcely any two nations agreed together in this any more than in language or habit of thought. Uniformity amongst ourselves was to be obtained not by entire change of system, but by amending and perfecting our own national system, which was excellent, and contained all the elements of the most perfect system possible, although it was unhappily confused and complicated in its details and in the mode in which it was carried out; and the remedying of this was the proper place to begin. The English system consisted in the happy combination of the decimal *with* the duodecimal; and this gave it an elasticity and comprehensiveness which made it superior to all others. But it is not carried out at present with any pretensions to uniformity; for example—112 lbs. to the cwt., and 16 oz. to the lb., 272 feet to a rod, are no part of a duodecimal system any more than they are of a decimal. They are clumsy adaptations from the traditionary systems, and therefore the duodecimal system must not be condemned on account of such anomalies, any more than by the gross inconsistencies of measuring work by various standards; as, *e. g.*, walling by an 18 ft. perch in Cornwall; a 16½ ft. perch in other counties; or by a rood of 63 ft. in the North Midland Counties. Then, again, uniformity would be more attainable by amending and enforcing our own practical detail than by *permitting* an entire change. The cwt. might be made of 120 lbs. as the wine pipe is 120 gallons, and the sub-division would naturally fall into their places. Without altering our foot, the acre might be 200 ft. × 200 ft. = 40,000 ft., instead of 43,560 ft. as now, and the mile might be 5000 feet instead of 5280 feet as now. The square mile would then contain 625 acres, the same as Mr. Penrose proposes, but the capacity would be less by a twelfth part. But it would be infinitely better to make the acre of such a number of feet as will throw into yards; *e. g.*, 45,000 feet to the acre, instead of our present 43,560, or, as proposed by Mr. Penrose, 40,000 for superficial measure. So also might have 6,000 feet for lineal instead of 5,280 as at present, or 5,000 as proposed by him. The mile would then consist of 8 "lines," of 25 yards each, and the acre of 8 "square lines." The YARD ought *not* to be sacrificed. The yard or pace is the most universal of all measures throughout the world, and through all periods, its quantity, of course, varying; and it is also the most practically useful. This fact suggested the "metre" for adoption in France, but the third of a metre is essentially incompatible with the decimal system of sub-division, if the foot (or span) is to be retained; and there is no reason why the foot should be given up, if applied in the manner which has been indicated. The decimal system, if carried out fully, proves imperfect; and although for pure numbers and for abstract calculation it may be allowed to be the best, yet it cannot be so considered for common practical daily use. It is, as it were, the finer instrument which might be used for the finer work, but not the rough and ready instrument best fitted for daily life, except in combination with the duodecimal system. For such fine calculation as Mr. Penrose had so ably made in determining the proportions of the Parthenon, and for all application of logarithms, the decimal system would serve best, but he did not think that the common mason and carpenter would be able or likely to turn it to their account. The division of the circle was both theoretically and practically one of the very first points to be considered in all geometrical calculations; and in this at least the decimal system had proved an entire failure, so that although the French had divided the right angle into 100° (the circle into 400°), yet they found its inconvenience so great that the astronomers had abandoned it and recurred to the old subdivison (360°). This point proved in favour of his argument, 360°[*] being the most *complete* number for practical use, according to the system which he was advocating, 12 × 10 × 3 = 360. Undoubtedly it is easier to divide and to multiply by 10 than by 12; but these were not the only nor the principal calculations to be taken into account, and it would be found that this advantage was not enough to compensate for the disadvantages in other respects. He granted, in reference to Mr. Penrose's remarks (p. 45, No. 4), that the decimal written expression $80\cdot\bar{3}$ ft. (the bar over the 3 indicating a recurring decimal) was as good as the duodecimal 80 ft. 4 in., but for speaking or dictating 3 ins. was *better* than $\cdot\bar{3}$ ft.—by whatsoever terms it might be agreed to call it. He granted that $80\cdot\bar{5}$ ft. was *better* written than 80 ft.

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[*] The system is said to have no counterpart in nature, but surely the universal agreement of the whole world as to the use of 360 for the days in the years, till modern science reduced the inaccuracy to its present fine solution, makes its adoption appear in the light of a natural, rather than a merely arbitrary or accidental choice.

6$\frac{2}{3}$ in., but he maintained that for the fraction, a simple number of inches was better than any other mode of denominating a fraction; and that fractions of feet (as of shillings also) were avoided by the duodecimal system, in the proportion of 18 calculations to every 8 of the decimal, whilst of the others which had a fraction, there were in the duodecimal 16, which had simply a number of inches (or pence, as the case might be), (*see* A.) as against only 8 in the decimal, which had a *simple* decimal fraction of a single figure (*see* L.) whilst of the others there were only 20 of compound fraction, as against 28 which had complex decimal fractions: and he had taken all the divisors from 2 to 9 with all the possible remainders—and all multiples of each other free of fraction, up to 10, *e. g.* three instances :—

6)3 ft.
Duodecimal result = 6 in. (A.)
Decimal ,, = ·5 ft. (L.)
7)3 ft.
Duodecimal result = 5$\frac{1}{7}$ in. (B.)
Decimal ,, = ·428 ft. (M.)
8)5 ft.
Duodecimal result = 7$\frac{1}{2}$ in. (C.)
Decimal ,, = ·625 ft. (N.)

And in multiplying, or in squaring dimensions, we have without a fraction :—

Duodecimal, 2 × 6 parts = whole	Decimal, 2 × 5 = whole
3 × 4 ,, = ,,	4 × 5 = ,,
And so on 18 times.	And so on, only 8 times.

And this applied to all calculations involving pence and inches, to simplify which, the decimal system was professedly advocated. He admitted that the duodecimal system involved a greater amount of application and learning in the first instance, but he maintained that so far from this being lost or waste labour, it was the very thing which gave to the English commonly, such a practical knowledge of the value of numbers, and made them good arithmeticians, and that the greater knowledge gave the greater advantages, as was the case with all learning. He could not consent to recognize the German system, even as duodecimal, much less as embracing that which made the English system so elastic and comprehensive. The Germans divided their small coin—the coin which takes the place of our penny—into twelve parts. And their largest coin, in common use and reckoning, was only 24 or 30 such pence; equal to three shillings of our money: verily, a poor assimilation to our own. Again, he did not consider a "permissive" Act was requisite to allow of anybody having their own rules or scales divided into tenths—and hundredths; but thought that such an act would legalise an amount of confusion and probability of error, with the absence of the uniformity that was aimed at, for the next fifty years, without any sufficient advantage to be gained at the end of that time; for the advantage ought to preponderate very vastly to make such a radical change justifiable. In conclusion, he had only to say that, desirable as an amendment would be in very many particulars in the present English tables, yet he, beyond all things, deprecated an entire revolution of system; still he must say, that if, unhappily, a decimal system and a radical change were forced upon us, he hoped it would be in accordance with the scale of "spans," so ably worked out by Mr. Penrose.

PROFESSOR KERR, Fellow, doubted whether this subject ought to have been brought before the Institute at all; still more whether they ought to have petitioned Parliament in favour of a decimal system of currency. It seemed to him that there would be great disadvantage in attempting to introduce the decimal system. They must look at it as practical men, not as mathematicians. The decimal system enabled them to calculate mathematical problems with the greatest nicety, and they had already adopted it for all such purposes, but when they came to ordinary calculations facility was the great point. What was the number *twelve?* Simply that number which met the continual practical requirements of subdivision into two, three and four. The number *ten*, on the contrary, was merely the accidental number (so far as enumeration goes) of a man's fingers. The Arab numerals of common use proceeded upon the basis of counting by the fingers. That was the sole origin of the decimal system. But it was plain that the number twelve had quite as sound an origin in another way, arithmetically more so. It divides by 2, by 3, by 4, by 6, and almost by 8 and by 9; 8 producing $\frac{2}{3}$rds and 9 $\frac{3}{4}$ths. The number 10, however, would divide by 2 and by 5 only. He had seen the working of a decimal currency many years ago in America, and he considered there was a great deal of inconvenience as the result. As was well known American money was reckoned in dollars, and hundredth parts of a dollar; and no doubt very pleasant and simple it appeared upon paper, so long as division by 10 was the only rule. But the Americans of course had continually to divide by 2. This they could accomplish; but here their difficulties began. They could not do without dividing by 4, and this they did not accomplish so well; they got at the quarter dollar (our shilling) of 25 cents, a very inconvenient number. Then, further, division by 2, continually required, produced 12½ cents (our sixpence), which again divided by 2, as was every moment necessary, produced 6¼ cents. There thus arose the circulation of two separate currencies, one decimal from the dollar, the American coinage and another—and this probably by far the most useful—duodecimal from the cent, in the shape of Spanish coins. The latter coins represented 6 cents and 12 cents. Accordingly, there came to be constant irregularities in computation. If an article was priced at the eighth of a dollar (our sixpence) the question arose whether it was to be paid for with 12 cents or 13. So, again, as they had a Spanish coin worth 6 cents exactly, and an American coin (the dollar $\div 2 \div 2 \div 2$) worth 6¼ cents; there was here also amongst the poor a greater because a meaner difficulty. All this was productive of a great deal of confusion, and sooner or later the Americans would have to alter their decimal system, instead of our altering ours to suit theirs. Moreover, to divide their dollar by three (one of the most frequent of transactions) was practically impossible, except in the compromised form of 33 cents. The only real divisor of the decimal system, namely 10, was obviously unwieldly, to divide by even its half 5, was practically never needed, and the only serviceable divisors in the decimal system were 2 and 4, a state of things most inadequate for common affairs. As for a legislative enactment, he was sure Parliament would never pass it, and indeed he thought the friends of the decimal system need give themselves no further trouble about it. Mr. Penrose had laid before them a system which, so far at least, did credit to his well-known mathematical skill. But surely the compromise of accuracy which it involved was most fatal. As a mathematician, Mr. Penrose could hardly stand long by a system of calculation which, as he himself fully acknowledged, compromised the essential accuracy of calculation on every hand. Mathematicians no doubt required for their purposes the decimal system pure and simple; and they posseseed it, and nobody interfered with it: but common reckoners equally required the duodecimal system, and under existing practice they equally possessed it, and there was no need for the mathematicians to interfere with it. The two systems co-existed in perfect amity, and would, beyond all doubt, continue so to do.

Mr. JENNINGS, Fellow, thought in the first place no necessity had been shown for any change of the present system. The simple question of a change, unless there were strong reasons for it, was an evil. It interfered with previous calculations and with the whole system of trade based upon those calculations, and also with the averages of produce in a variety of ways. The system all over the country was based for produce upon yards, feet and inches, and upon acres downwards for measurements of quantities. He admitted that great inconvenience was occasioned by the difference of weights and measures in various parts of the country, and, in some instances, in different parts of the same county.

That was a subject most important to be taken up, and it could be dealt with so as in a great measure to remove the evil. His own view of effecting it would be this—in any proceedings in law taken upon any bill the calculation should be made upon a fixed legal system, not that of the Cheshire acre, not of the pound avoirdupois in one case and the pound troy in another. There should be a fixed standard for a pound weight all over the country, and that, he submitted, could easily be done. They should, as far as possible, endeavour to make the weights and measures uniform throughout the kingdom. With a very little difficulty they might get rid of the foolish rod of brickwork by reducing it into yards and feet direct. That was a thing easily done; but if they altered the general system it would occasion great inconvenience for a long time, and why should they have that inconvenience unless it would be shewn to be absolutely necessary. He believed he was correct in stating that chemical combinations were not decimalised. There were a comparatively small number of subjects which combined in decimal proportions to what combined in duodecimal proportions. He entirely concurred with his friend who preceded him, that practical men would never adopt the decimal system, and if Parliament consisted of practical men, they woold never pass it; and further, if it were attempted to be introduced by compulsion, it would occasion serious disaster throughout the whole country. There was a difficulty even in getting uniformity in a single county: what would be the difficulty attendant upon an entire change of system throughout the kingdom? He hoped the Institute would not commit itself to this scheme.

Mr. THOMAS MORRIS, Associate, said it appeared to him that the object of legislation should be to assimilate, if possible, the measures and systems of nations; the consideration of details was a matter of minor importance. It also appeared to him that, within the last few centuries, science had enabled them to appeal to Nature for the proper standard. The solar day was now divided into 86,400 seconds, but if it were divided into 100,000 parts, instead of 86,400, then a pendulum vibrating one of those seconds 100,000 times a-day would measure about 30 inches. That appeared to him to be a very convenient standard of measure—as much so, perhaps, as the French metre or the English yard. The pendulum would differ a little at the equator, where it would be shorter as compared with the poles; but he thought if the equatorial pendulum was taken as the unit of measure, it would be accepted by all nations on both sides of the equator, and out of that might arise a national assimilation of measurements. When a standard of length was agreed on, one of capacity would follow with great facility; and when a measure of capacity was established, one of weight might be introduced with equal simplicity. He thought these initiative principles should take the lead in the discussion of this subject, and then the details would follow, as a matter of course.

The physical relation of length and weight may be thus illustrated:—

	Rate of fall in a second, in feet.	Length of pendulum, in inches.
Equator	16·0463	39·02
Middle Latitudes	16·084	39·114
London	16·0954	39·13908
Spitzbergen	16·1264	39·2164

THE PRESIDENT, Professor DONALDSON, could not allow this discussion to close without saying a few words. He did not understand advocates for the duodecimal system, for our method of computation was not founded upon duodecimals alone; and though it was true the foot was twelve inches and the shilling twelve pence, what was the pound sterling? and what the penny? and what the pound weight? Take the whole system, it was in no particulars duodecimal or decimal, but a strange confusion through the whole series of weights and measures. If, therefore, gentlemen advocate no change, were we to be left in the abnormal condition in which we are now? The objections he could not understand.

What was the *foot*? It had no positive existence in nature, whether the foot of a giant or of a pigmy was taken as a standard, but if we took the *metre* it was a measure in physical nature, a geometrical unit, and therefore to start from it as a measure seemed a most scientific way of proceeding. He thought it should be a great object to have uniformity with foreign nations. Why should they hold to a standard of their own instead of a common one by which they could understand the measurements or monies of other nations. Rgarding all nations as one common brotherhood, the greater the uniformity of thought, language and manners, the more the common state of civilization would be advanced. One gentleman had advocated the yard as an unit of measure; but if the yard, why not adopt the metre, which was a measure positive and decided? It was stated that the decimal system, if adopted under legislative sanction, would only be permissive, and of course it would be so at first. It required half a century in France to establish the metre or decimal system there. Any Act of Parliament on the subject must therefore be only permissive to accustom people to its use. Great mathematicians proved how much facility there was in the adoption of decimals, how much that system abridged arithmetical education, how easy it was to teach it in the common schools of the country, and how it saved years of labour. The plough-boy, instead of having to learn the complicated and varied weights and measures of the country, would have a simple system put before him; and in lieu of devoting three years to arithmetic he would accomplish it in one. It had been said that practical men would never adopt the decimal system; but the truth was that the most practical of men, the engineers, did adopt the decimal system, and had introduced it to a great extent in their measures and calculations.

(Mr. Kerr remarked only for mathematical calculations, not for practical matters.)

The President added that he thought the arguments against the decimal system failed, particularly with regard to money. They had the decimal in the pound sterling, and the duodecimal in the shilling, and no system with respect to the penny!

Mr. Penrose said, without question the duodecimal system represented multiples of 2, 3 and 6, and the decimal system only those of 2 and 5, and a larger proportion of numbers was divisible, without fractions, by duodecimals than by decimals, but he regarded it as a practical question, and there were practical considerations in favour of the decimal system. In measuring an object, they did not expect to find the duodecimal sub-divisions exactly hit the length of it. They had to consider the nearest point to arrive at, and the decimal sub-divisions found a point just as near, and easier to read off. He had worked a great deal with both systems, and had found out which was easiest to himself, not only as a mathematician, but in practical measurements. He invariably measured by decimals for his own use; though he had not adopted them in his business communications. He was glad to find that, at all events, there was a strong feeling in favour of uniformity, which might serve as a precursor to the decimal system. He could not admit the argument of his friend, Mr. Kerr, that the system he proposed compromised accuracy, for if the span system he proposed found favour, it would be accurately 25-24ths of the foot; so that the standards would not have to be changed on its account. When he spoke of the mile of 5,000 spans, as practically our present mile, he did not mean that it was so accurately, but so near to it that between London and Southampton, for instance, it would not make a difference of many hundred yards.

Mr. Kerr remarked that it might make a serious difference in questions of boundaries nevertheless.

Mr. Penrose added, that the object was to obtain the advantage of calculating with simplicity. He did not set up any particular plea for the "span" in preference to the decimal foot, but he did plead for the decimal system and the retention of our national standard.

The meeting then adjourned.

ANNOUNCEMENTS AND OCCASIONAL PAPERS.

SUNDRY NOTES UPON SOME MISCELLANEOUS SUBJECTS.

By John P. Seddon, Hon. Sec.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, February 15, 1864, Owen Jones, V.P., in the Chair.

My only excuse for occupying your time this evening upon so vague a theme as the above is, that the remarks I have to offer you are entirely impromptu, having been written in consequence of the postponement of two papers which had been promised for this evening's entertainment; and I venture to endeavour to improve the occasion by impressing upon the members in general the awful responsibility they incur both by promising and by not promising their fair share towards the series of papers upon which this Institute *exists.* I have used the word *exists* advisedly, for whatever difference of opinion there may be as to whether the interests of architecture are materially furthered or not by the reading of such papers and the discussions which ensue,—and I have heard cynically-disposed members of our profession dispute the fact that good to art can arise thence—there can be no doubt that the very pabulum of our Institute, and of such learned bodies in general is *talk*, and that by the cessation of a continually sustained supply of such, its peculiar food, the most carefully constituted and duly chartered body must as inevitably perish of inanition as the human frame if deprived of its daily bread.

Gregarious philosophical life, is, however, maintainable upon easier terms than animal life,—and I beg you to mark that I speak this for your comfort and encouragement—so that though the economist failed before he had succeeded in getting his horse to subsist upon one straw a day, I live in hopes that this Institute will not absolutely die of inanition during the next fortnight, although I have little more in proportion to offer to it than that somewhat illiberal and questionably practical sage gave to his steed.

I will, in the first instance, make a few brief remarks upon the character of the papers read at these meetings.

It were much to be desired that members would look upon the preparation of one such paper occasionally as a duty they owe to the Institute. All must have some special information their brethren would be glad to hear—some work in progress of which a brief account would be interesting. I think the "Transactions" are too much looked upon as necessarily consisting of elaborate treatises upon theoretic or general constructive subjects; whereas, in my opinion, they should chronicle all that is being done of any importance in the profession. If members would bring the drawings of their works and read short descriptions of them, and bear with the friendly criticism of their fellow-members, both we and they would gain much. The feeling which prevents this is doubtless a wholesome one in itself, namely, a fear either of being, or being thought, egotistical;—the dread of the former would, however, I am sure, always so temper, as it has done hitherto, the communications of members that the latter fear need not be entertained.

To turn now to subjects of more general interest. I cannot help thinking that considerable advantage may be gained by an occasional review of the architectural changes which in this age of Eclectism are passing daily before the scene of our vision; for I believe if we could fully realize, as posterity will realize, the drift of the several fashions which successively enthral us, we should not follow them with quite the blind pertinacity which we often do. We are all, perhaps, capable enough, and even too ready, to criticise the works of our brother architects, and it may seem invidious to ask you to do so now. But as individualities are easily avoided, I shall venture to direct your attention to sundry types of what I believe to be errors in the works of the present day that it would be well to be aware of, that we may avoid them.

The facilities for travelling in the present day enable most of us to keep pace with the knowledge of the architectural efforts not only in the metropolis, but also in the provinces and in the neighbouring countries upon the Continent, and our study of old work painfully impresses upon us that for numerous reasons modern work is usually inferior.

The architecture of to-day is undeniably upon the road of improvement. Each successive decade of years sees the work of its predecessor numbered among the exploded, because mistaken, aims of the past. It may be distasteful, but it is surely wise, to examine narrowly our own work in the same spirit, lest it also take its place hereafter in the same category.

In all ages of progress some master minds lead their fellows, and the weaker men are apt to follow the stronger in those minor peculiarities and mannerisms which they can best affect, and thus a type of work comes into fashion which to a certain extent brings ridicule upon the better work of the leaders of such a school, whose merits far outway these demerits. These mannerisms, however, even granting that they are exaggerated and perhaps parodied by less worthy followers, are nevertheless blotches upon the escutcheons of even the best architects of the present day at which posterity will point, and which it is well for us to prejudge that we may endeavour to free ourselves from them.

Among such mannerisms is one into which many men of promise and ability occasionally fall, and it is a rock upon which we may fitly raise a beacon of warning. The only term by which I can describe it is the *hair-stand-on-end-style.* Some ambitious advocates of this class of work have adopted as a more euphonious title "The Victorian," but I object to this as a libel upon the age of our most beloved and august Patroness, nor would such name be at all sufficiently comprehensive to include all the works I refer to. The distinctive feature of such works is that they have been produced by an hysterical amount of effort; they entirely lack the simplicity of old work, and seemed designed with the object of startling all beholders, and impressing them with the extraordinary cleverness of their gifted authors. Almost all old work, and certainly all the best of it, appears to have been done with an ease and absence of effort, resulting from simple-mindedness, and the honest and contented attempt to fulfill the conditions imposed upon their authors, whereas from the struggling for the foremost place which competition* induces at the present day our architecture seems imbued with the same spirit of ambition—while old work therefore gives the impression of a surplus of power beyond that employed, modern work generally seems the result of effort stretched to the full and often overstrained. As in poetry, suggestiveness is one of the highest qualities, so in architecture, a building which suggests more than it actually expresses will be found to give the most lasting pleasure.

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* I cannot refrain, while speaking of the effect of this rivalry upon modern architecture, from saying a word upon Architectural Competitions. When will the profession awake to the sense of its own dignity, and refuse to waste labor, time, and temper in being pitted, one member against another, at the beck and call of irresponsible committees? Some combination is requisite for this purpose, as the temptation is too great for architects without practice to refuse. Surely some general principles might be steadily urged, till at last conceded; as, for instance, that all competitors be paid fairly for their work;—no compromise on other terms ought to be admitted:—in fact, the whole system ought to be abolished, as lotteries have been already. If the Institute were to declare all competitions gambling transactions, from which its members ought to abstain, and even require them to do so, I believe we should soon hear no more of them. And for whose benefit should they be suffered to exist? Do the public get what they want by them? Notoriously not so. The best architect does not, dares not, do his best work for a competition. The result is always unsatisfactory, and never worth the wrongs and the heartburnings it occasions.

The *hair-stand-on-end-style* is not to be confounded with another hereafter to be noticed, which revels in crockets and pinnacles, but is known rather by the quality than the quantity of such features, and even by an affected refraining from them. It is essentially, however, of the spiky nature, its windows are like lancets long drawn out, its cusps are of the queerest description, and the dressings of its openings are notched as if bitten by some gigantic rhythmically ruminating animal, its polychromy, however, is its most astounding feature, its pride and its power, and by a vigorous use of this terrific engine, it can stiffen every hair of the unfortunate beholder. I had the misfortune one Sunday a few weeks ago to attend service at a new church in one of the suburbs of London, where the arcades were so acutely pointed and barred with black, red and white to so alarming an extent, that the congregation will be obliged, I am sure, if they would preserve their eyesight and peace of mind, to attend the services in blinkers; and there is a large dissenting chapel recently erected, in a town in the north of England, of this type, which is so alarmingly striped and vandyked, that it has locally obtained the appropriate name of the Holy Zebra.

The next style I would refer to is that which may be fitly called *the vernacular* 19*th century Gothic* style; it subsists upon pinnacles and crockets, and such like extraneous decorations, the quantity of which is a mere question of money—given such a sum, how many crockets and pinnacles, &c.,—the result is usually calculated by surveyors at so much per mile, and this class of work can be best carried out upon the limited liability principle. Now as nobody cares about crockets and pinnacles, which are but a miserable substitute for thought and art of greater expression, any more than about tryglyphs and guttæ, it is to be hoped that they will, like all such architectural greenbacks, soon come to their due state of depreciation in the market.

One very admirable school of architects has, I am sorry to say, been suffering for some time from a peculiar tetanic disorder, affecting its ornamental details, and it can hardly be said to be yet convalescent; this may be described as the *galvanized glove-stretcher mania,* and has been caught from a too close study of the Early Gothic foliage; it was very prevalent in the International Exhibition of 1862. It is, however, a disorder by no means liable to be fatal, and it is to be hoped may give way after a judicious course of studies of more natural and common sense types, which is the remedy I would suggest.

As to the various phases of the *classic malady* which it is deeply to be deplored has become chronic, so that it still continues to affect a large portion of the community, it is much to be feared that it has brought its adherents into a state of atrophy, and the most strenuous endeavours are still imperatively called for on the part of those who have been rescued from it to rouse their deluded brethren to a sense of their much-to-be-lamented condition, or failing that, to prevent the spread * of its cankering disease; but as a most serious fever of a similar description has been for some time desolating our neighbours upon the other side of the Channel, and has reduced their formerly picturesque metropolis of Paris to the semblance of, as it seems to me, a gigantic asylum for highly respectable lunatics, some earnest words of caution are, in my opinion, desirable to prevent the necessity of the importation into our own metropolis of a supply of straight jackets, which will be most certainly required if the rage for the long straight streets, with their attendant monotony, which are so much the vogue over there, be allowed to gain head in this country.

The escapade into the Early French Gothic territory in which some of our mediævally inclined friends have indulged of late is a matter to be watched with extreme caution, as was that into the region of Italian Gothic which preceded it, and the truants require to be reminded that equally valuable stores exist at home which they do not well to neglect, though they may add to them any special beauties from other localities which will not interfere with the characteristics of their own national style.

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* A very hopeful sign is, that out of the numerous designs sent this session in competition for the premiums offered by the Institute, not one is in the Classic style, but all, without exception, are treated Mediævally.

However, to speak seriously, I believe that with all our vagaries and extravagancies,—and it must be owned we have plenty of these, the state of art and architecture in England at the present time is healthy and hopeful; and if we would only condescend to be simple and true, and work out with a thorough honesty of intention the requirements we are called upon to fulfil, thinking less of ourselves and our reputation and more of our work for its own sake, with steadiness of purpose in that direction alone which each may decide with care to be the best, looking thence neither to the right nor left, we should, doubtless, leave to posterity work of which we should have no need to feel ashamed. Here and there in London, and at Birmingham, Manchester, the neighbourhood of Halifax, Leeds, and elsewhere, are many buildings of recent erection* to be seen of far higher mark than ordinary, and in the multiplication and further improvement of such the members of this Institute have been, and it is to be hoped will be still more instrumental, and that through the education of the public in taste by their means such extraordinary specimens of architecture as the "Holy Zebra" will be hereafter classed with the extinct Dodo, so as to serve only for the amusement and bewildering of future antiquarians.

The CHAIRMAN asked whether any gentleman was going to get up to defend the "holy zebra," or offer any observations upon it. Otherwise he would propose a vote of thanks to Mr. Seddon for teaching them what they had to avoid. His remarks were very just, though probably many of the unfortunate architects would not like to hear how their works had been criticised. It was a difficult question, at the present moment, to know what was good architecture. They did not seem to have one prominent bond of union amongst them, so that they might work on one common ground, but each one worked according to his own particular fancy and idiosyncracy. There was at present very great confusion, but as Mr. Seddon expressed it, he hoped that the generation now rising up would do better. There was a possibility that the Institute was helping on the work by their Examinations and bringing members together for the interchange of thought and ideas. So in some few years, perhaps, they might see a change; although they could not hope or expect that it would come all at once. He did not think it was to be regretted altogether that they were now passing through the state of disorder which had been described in Mr. Seddon's paper. Perhaps these things were necessary, they would see that the efforts of the architect in particular directions would not do, and that anomalies would gradually wear themselves out. When he saw many of those extraordinary attempts of the present day to bring back the architecture of the past, and trying to make it move on a-head, he rather felt glad to hear of these unfortunate failures, because when the whole period was gone over, people would begin to ask themselves whether that was the right way to set about it, or whether we ought not rather to take our civilization with its wants, and endeavour to make our architecture be the expression of it, just as it was in the period of the past. Mr. Seddon, in his paper, remarked that many of the buildings of the present day seemed to be devised by the desire of the author to exhibit all his knowledge, and sometimes more than he had got. It was quite true that that was one of the great distinctions between the works of the present day and the great works of antiquity, which were very simple. The interior of an Egyptian temple was hardly more than the union of a column with a beam, and all the grandeur was obtained by the repetition of these simple elements. But the architect of the present day wanted to put all the variety of his sketch-book into one building, and the result was that they had too much design instead of too little. There was no unity of idea and simplicity of purpose. He thought they had yet to learn that, and it would only result from an entire breaking up of the present system, and out of the fragments they might hope to do something better. They might not, perhaps, live to see it, but no doubt the future would produce a better style.

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* The best of these are Mediæval, and of the remainder the largest number consist of a sort of amalgamation between Classic and Gothic, the details being treated on the Mediæval principles, and therefore so far an improvement; the next step must be,—and the sooner this step is taken the better,—to discard altogether the worn-out skin of Classicism, and to treat the whole, as well as the parts, upon those principles of common sense which guided the Mediæval builders, but not going back to any precise style of theirs, any more than they did to those of their predecessors.

Mr. C. Fowler, Jun., remarked that, although he should cordially join in the vote of thanks proposed to be given to Mr. Seddon for amusing them for half an hour, yet he did not like to do so without entering a protest against one of his observations, and that was his wholesale condemnation of the works of our neighbours across the channel. He though that, though their good friend Mr. Seddon might not like those works, yet in some respects they were good in themselves, and very suggestive for study. It could not but be said, he thought, that some of their details were cleverly designed and equally cleverly carried out. In some of their private buildings the entrance halls were designed with great originality, and generally with a great deal of variety. Nothing struck him more during a recent visit to Paris than the designs of the entrance halls and passages in the domestic buildings. The Parisians were much more successful in this respect than we were, and more especially in their designs of public monuments and in the manner of placing them. Some of their minor monuments and public fountains were so exceedingly successful that one would be very glad to see something similar here.

Professor Kerr, Fellow, would thank Mr. Seddon for a paper prepared in haste to help a meeting in distress; at the same time he would venture to suggest that in many respects it showed a want of study, and was expressed in language which was pointed—very pointed indeed—pointed in a manner which was not usual in this Institute, and which he thought was not necessary for the subject. If Mr. Seddon had been present, he could have expressed his mind a little more freely; but at all events there was a great deal in the paper that was very clever. He was glad to find, in fact, that the school which Mr. Seddon represented was beginning to come to its senses, and he hoped it would come round more and more—he would not say until "extremes meet," but until two schools which had the same object at heart, would agree once more to pull oars, on different sides of the boat certainly, but not against one another.

Mr. Ferrey, Fellow, said, with regard to what his friend, Mr. Seddon, had observed about the introduction of varied colours of spiked and peculiar forms, and so on, he entirely agreed with him. He thought it was time they really fell back again upon some ancient models. He knew in that expression that he should not be supported by many of those present, who would say that this was an age of progress, and therefore they should endeavour to set aside all ancient styles and learn something new. In that respect, he thought, Mr. Seddon was wrong. They ought to study ancient examples, and fall back upon ancient models—of course making use, as far as they could, of those different advances in science and knowledge which the present age afforded them. Some remarks had been made with regard to the buildings in France. It was a curious fact that in a recent tour which he made through Normandy, he did not find a single new secular building erecting in the Mediæval style, which shewed that if we were going too far one way, our neighbours were not advancing at all with us in that direction. Many of the buildings in Paris were faulty; they seemed to him to shew a vast amount of attempt at ornament, without that ornament possessing any real meaning. But it was certainly a remarkable circumstance that abroad there should be an entire absence of Mediæval architecture in the new buildings; so that, if we on this side the channel were carrying the Mediæval to an extreme, our neighbours on the other side were ignoring it, which was much to be regretted.

The Chairman thought the reason why the French had not so much practised Gothic architecture resulted from their academic system. All their young architects went to Rome and lived a sort of academic life, and the architecture they had brought back to France was mostly Italian, which they practised generally. But certainly they had been able to produce a character of their own, and they had a school of Italian architecture in France, which was easily recognised as the French translation of Italian. There was a great deal of unity about it. He did not say he altogether approved of it, but it had a sort of family likeness which one did not find in any English work. In England, architecture was individual—architects were working discordantly; but in France there were schools, and one could recognise whether a man was a member of one school or another. Gothic architecture was certainly not generally practised there, except in restorations of ancient monuments.

Mr. EDWARD HALL, F.S.A. (Visitor) said that, there were five or six Gothic churches, either recently completed or nearly completed, in Paris. He recollected, since the time of the erection of the Eglise Ste. Clotilde,—the Eglise Ste. Eugènie, by M. Boileau, in the Rue Ste. Cécile, near the Conservatoire de Musique,—the Eglise Saint Bernard at La Chapelle, by M. Magne (which was on the north of the boulevart exterieur) and another in the same neighbourhood. Then there was the Eglise de Jesus (little known) of the Rue de Sèvres, similar in general design to Exeter College Chapel, Oxford, although less elaborately decorated, except as to stained-glass windows. He thought, if necessary, he could produce instances of the erection of, at all events, six Gothic churches, shewing that at this time there were at least two styles of ecclesiastical architecture prevailing in France. However, the Gothic now used in France, unless with the exception of that of the church in the Rue de Sèvres, was very inferior to our Gothic in what he considered was the particular merit of English Gothic, viz., logical character, or structural exactness in ornamentation—in short, that which was the principle of Gothic architecture in general. It was a fact that there was a prevalence of Gothic architecture in the modern ecclesiastical buildings of Paris, side by side with different versions of Italian or Renaissance. The churches, the most recently commenced of all, which had been considerably advanced since he was in Paris, it was true, were in Italian or Romanesque styles. There was one of these latter churches on the Boulevard Malesherbes, Eglise St. Augustin, at the fork where the Boulevard turns to the west, admirably placed; and there was another, Eglise de la Trinité, at the end of the Rue de la Chaussée d'Antin, also placed so as to impart wonderful effect to the street architecture. (Mr. FERREY explained that his remarks applied solely to secular and municipal buildings.) Mr. HALL added that, in the environs of Paris, and in many great towns, there were secular buildings of a certain Gothic character; but, generalizing, Mr. Ferrey was correct in his observations. The municipal architecture of France was ordinarily some version of Italian. There was a revival of the Louis Quinze style; but, for art, the most prominent style of all was the Græco-Italian, apparently deriving something from the influence of the lately deceased foreign member of the Institute, the Chevalier Leo von Klenze. At least, the Parisian architects had well studied the originals which contributed to that manner, and the works of the architects attached to the city of Paris, especially, were remarkable in their invention of detail of the Græco-Italian sort. He thought the whole of the architecture of Paris deserved much more study than the English architects generally gave to it.

A vote of thanks was then passed to Mr. Seddon for his paper by acclamation.

MEMOIR OF MR. JOSEPH GWILT, ARCHITECT.

By his Son, Mr. Sebastian Gwilt.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, February 15th, 1864.

The late Mr. Joseph Gwilt, born in the year 1784, was the second surviving son of George Gwilt, an architect of some celebrity, holding in the year 1770 the appointment of architect and surveyor to the county of Surrey. His chief works whilst he held those offices were Cobham, Leatherhead, and Godalming Bridges, the Bridewell in Great Suffolk Street, and the County Gaol in Horsemonger Lane. Mr. Gwilt on his first entrance to business had the good fortune to meet with the patronage of Mr. Thrale, the brewer in Southwark, under whose roof he became acquainted with Dr. Johnson, but cordiality never existed between them from his dislike of the doctor's unpleasant temper. In the year 1774, on the passing of the Building Act, Mr. Gwilt was appointed by the Surrey magistrates to the district of the parishes of St. George, &c., &c., Southwark; on the passing of the bill for making the West India Docks in the Isle of Dogs, he, in conjunction with his eldest son George (a gentleman well known for his able restoration of the Lady Chapel, &c.) was appointed architect, and completed six of those large warehouses. Mr. Shaw, the present architect of Christ's Hospital, as well as his sons George and Joseph, were amongst his pupils.

Joseph, the subject of the present memoir, received his earliest instruction at a boarding school; in 1798 he was removed to St. Paul's, where he remained nearly two years; at the latter end of the year 1799 he was placed in the office of his father; in 1801 he was admitted a student of the Royal Academy of London, and obtained the silver medal of that institution for the best drawing of the tower and steeple of the church of St. Dunstan's in the East, on the 10th of December in the same year. In 1811 he published his first work,—a Treatise on the Equilibrium of Arches, which proceeded to a second edition in 1826. In 1815 he was elected a Fellow of the Society of Antiquaries of London. At the end of the following year he visited the principal cities of Italy, in company with Mr. J. S. Hayward, an intimate friend, whose taste in the arts was universally acknowledged and esteemed; after this journey he published in 1818 his Notitia Architectonica Italiana, or concise Notices of the Buildings and Architects of Italy. Then followed in 1822 an Essay on the Origin of Caryatides, in a letter to John Britton, Esq.; in the same year, Sciography, or Examples of Shadows, with Rules for their Projection, which proceeded to a second edition in 1824. In the year 1823 Mr. Gwilt competed for the new London Bridge, and although to his design the three architects of the Woods and Forests (who had been appointed by the Corporation of the City of London to select on this occasion) awarded the first premium, he was nevertheless deprived of the reward he so justly merited, neither was he allowed to carry his design into execution, which cannot now be ever but a subject of regret, whenever the present building is beheld. During the altercation that arose, a letter was addressed to Mr. Holme Sumner, M.P. by him respecting the conduct of the Corporation on the rebuilding of London Bridge. In 1824 he published a plate, showing a comparative view of the four principal modern churches in Europe, by means of transverse sections of them to the same scale. In this year also appeared a small work, entitled Rudiments of Architecture, in one vol, 8vo. In 1825 he published an edition of Sir W. Chambers's celebrated Treatise on the Decorative part of Civil Architecture, with an original examination of the Elements of Beauty in Grecian Architecture, and an Investigation of its origin, progress, and perfection, 2 vols. imp. 8vo.; in 1826 a translation of the Architecture of Vitruvius, imp. 8vo. In 1833 he was elected a member of the Royal Astronomical Society. In 1835 the Treatise on the Art of Music, published in the Encyclopædia Metropolitana, was from his pen; in 1837-8 appeared Elements of Architectural Criticism, which he inscribed to his friend the late Mr. Charles Robert Cockerell; and a pamphlet (in conjunction with his son John Sebastian) relative to a National Gallery being erected on the open plot of ground at Charing Cross. In 1842 he supplied the articles relating to architecture as well as those relating to music in Brande's Dictionary of Science, Literature, and

Art, and his chief work was published by Longman and Co. in the same year, entitled an Encyclopædia of Architecture, whereof a second edition was issued in 1845, including an addition of a Treatise on Gothic Architecture. In 1848 he revised and corrected an edition of Peter Nicholson's Principles of Architecture; this, with the exception of some minor works which appeared subsequently in some of the periodicals, was his last.

Mr. Gwilt held the appointment of Surveyor to the Commissioners of Sewers for the limits extending from East Moulsey, in the county of Surrey, to the river Ravensborne in Kent, for a period of forty-seven years, having succeeded his father who held the appointment previously for the space of thirty years. He was also architect to the Imperial Insurance Company, to the Worshipful Company of Grocers, the interior of whose hall was entirely re-arranged, and the house of the clerks rebuilt by him; and also the Worshipful Company of Wax Chandlers. Among his works are a church at Lee, lately pulled down, the land approaches to the Southwark Bridge, Markree Castle in Ireland, and St. Thomas's Church at Charlton, together with numerous other buildings of no important interest. There is, however, one of his designs which demands particular notice, namely, a design for laying out for building purposes the estate of Sir T. M. Wilson at Hampstead, which had it been carried into effect would have fully shown the great taste that he possessed both for the architectural as well as the picturesque department of his art. The viaduct there, however, is the only part of the idea executed. Unfortunately the erroneous notion of the public that Hampstead Heath was to be built upon has hitherto prevented the erection of such Italian villas, which instead of deteriorating from the beauty of The Heath would have considerably added thereto. A slight model of the scheme is in existence, and can be seen at the estate office, Hampstead Heath, which amply justifies the fact here stated.

Mr. Gwilt was frequently consulted by the Office of Woods and Forests, and on many occasions gave important evidence before committees, both of the House of Lords and the House of Commons, more especially in regard to the present Building Act, which he in conjunction with Mr. Penrose projected nevertheless to many of the clauses thereof he gave his most strenuous opposition, but was overruled. In the year 1834, in connexion with other professional gentlemen, he was extremely anxious that a British Institute of Architects should be formed, but after several meetings the subject was dropped, and through some misunderstanding he himself never joined the present Institute, although he was greatly interested in the success it has achieved. For many years of his life, from being an accomplished musician himself, and on intimate terms with so many of the leading professors, he was in the habit of holding at his house, fortnightly, musical soirées, at which were played Mozart's quartetts, Haydn's septetts, and other classical music, his own instrument at these parties being the tenor. At the coronation of the Queen, owing to his musical knowledge, he was selected to act as signal officer to the choir. In his own profession he was a thorough disciple and an ardent admirer of Palladio, and ever considered the Italian style of architecture best suited to the climate of this country. He made frequent trips both to France, Belgium, and Germany, and in addition to the remarks entered in his journal, it was invariably his custom to embellish it with exquisite pen and ink sketches of the objects which chiefly interested him during the journey. After a long, honourable and arduous career of upwards of fifty years he retired from the active pursuit of his profession, and for the last few years preceding his death he resided at South Hill, Henley-on-Thames, at which place he closed his useful life on the 14th of September, 1863, in the 80th year of his age.

Mr. Black, Fellow of the Society of Antiquaries, and President of the Chronological Institute, stated that the late Mr. Gwilt's son, in the memoir just read, had omitted to mention one of his father's publications which tended to shew the diversity of his talents. He (Mr. Black) knew him fifty years ago, as an accomplished scholar and the author of a "Grammar of the Anglo-Saxon Language," which he compiled and issued as a separate publication.

A vote of thanks was then passed unanimously to Mr. Sebastian Gwilt for the above memoir.

ON IRON AS A BUILDING MATERIAL.

By G. AITCHISON, Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, February 29, 1864.

I PROPOSE to treat of iron as a building material, but the limits of this paper will only allow me to touch very slightly on the different considerations connected with its use; for to thoroughly exhaust the question would be to give a complete treatise on Architecture, considered as a science and as an art.

Within the last half century, the use of iron has become so general that it has nearly usurped the place of every other material. In every construction, machine, tool, implement, or article of domestic use we turn to, we find iron doing duty not unfrequently in the most unexpected ways and places. If we require permanence and durability, as in a bridge, we have iron; if we want lightness, as in a shed, we have iron; we have iron ships, iron churches, iron huts, and shall soon have iron forts. Our wharf walls are iron, our umbrella sticks, our shirt collars,—and, should we be unfortunate enough to require a surgical operation, we are operated on with an iron knife and sewed up with an iron thread. Whether we want to imitate the touch of the human hand, the delicate fragility of the teazle, or to resist the greatest force of artillery, we use iron.

Being, then, in the very middle of this "iron age," surrounded by iron, perhaps partially encased in it, with our very spectacles of iron, how is it that we can so shut our eyes to the great advantages it offers? Why should architects alone refuse to profit by it, or, when they are absolutely obliged to use it, give it a sort of grumbling recognition and put it out of sight. There are many who have used it with success, but by the profession generally it is avoided. What is the cause of this? Are architects really unconscious of this material ready to their hand, crying out to be loosed from the spell of ugliness under which it lies? Is our profession the only one which is standing still while every other is rushing on with unparalleled swiftness? If not, how can we account for this strange supineness in not seizing on iron with avidity, and creating an iron architecture? I think the cause may be traced to our education and our want of education. The architectural education we have received has succeeded in making us good, tractable, humble scholars; never thinking but as we have been taught, and handing down our traditions from one generation to another, and reduced to such intellectual bondage that we never dare hope that we can equal the architectural works of any preceding age. At one time it was said, "You cannot equal the architecture of the ancient Romans; perhaps you may imitate it," as schoolboys imitate Virgil in their verses, and shew their skill by tagging a line with a piece of his pure latinity, so we tried to give an architectural flavour to a plain brick house by adding a real imitation Roman Doric portico in stone or plaster. Then it was said that we could not equal Greek architecture, but we might imitate it. Horace was quoted to us, and we were begged to study Greek examples by day and night; now it is the Italian, the Byzantine, the Norman, and the architecture of the 13th century which is recommended for our imitation. What little information we might have gained of the strength of a lintel or a column was hidden by a mysterious scale of minutes and modules. While we have been laboriously pursuing the study of the particular mouldings, ornaments, and fashions which distinguished different epochs, we have had no time to bestow on learning mathematics, statics, and the strength of materials; besides, "all that sort of mechanical knowledge" was considered as "rather beneath an architect." It was for builders, clerks of the works, and carpenters to study such things. If an architect ever wanted such knowledge, he could readily hire some one who had it, or pick it up when he got into practice." Besides, as we were bound to imitate something that had been done before, it was useless to know the strength of any material; we dared not alter the shape nor proportions of our copy; we dared not attempt new ornaments,—to what end, then, should we aspire to be really architects? Brick, timber, and stone buildings had been executed for so many years that every difficulty had been solved. But when we used iron, we had few examples to consult, and were all in the dark. It was generally too costly to give it the form of stone. It was subject to sudden and mysterious failure. It could be cast, it is true, to almost any form we wanted, but the founder told us that such a form would tear in cooling, or the ornaments could not be done, or that where we wanted it to be hollow it must be solid, or when we wanted it solid it must be hollow; in short, it involved study, thought, trouble and risk, and even then it could not be made to properly resemble anything that our great masters had done. It appears, then, that iron differs in this respect from other materials; that we must have some slight acquaintance with the laws by which it is governed before we can use it properly or safely; while with the latter long-used materials we have only to remember or repeat.

The chief reason I have for reading this paper is, the hope of inducing the profession generally to turn more of their attention to this material, so that many if not all the obstacles that prevent its use may be removed, and the difficulties that surround it overcome.

To appreciate its value as a building material, we must compare it with those materials whose place it is about to supply, for we cannot judge of its capabilities until we know in what relation it stands to them.

The materials generally used for building are stone, brick, or timber; and we must know their relative strength, bulk and cost, their comparative durability or resistance to the ordinary and extraordinary forces of nature, before we can see how their place is to be supplied. In the first place, we want to know their comparative strength, and for this purpose we have only to know their ultimate crushing and tearing strength.

TABLE OF RESISTANCE OF MATERIALS TO A CRUSHING OR TEARING FORCE.

	WEIGHT PER FT. CUBE. In lbs.	TEARING SQUARE INCH. In Tons.	CRUSHING SQUARE INCH. In Tons.	SHEAR SQUARE INCH. Tons.	CROSS STRAIN SQUARE INCH. Tons.
Cast Iron	450	7	50	12	3·4
Wrought Iron	480	20	20 *	20	...
Portland Stone	134	0·4 *	1·5	...	...
Granite, Aberdeen	164	0·35 *	5	...	...
Brickwork in Cement .	117	0·034	0·23	...	·00156
Fir, Memel Dry.........	40	with grain 6 across do. 0·3	3	3	·50
Oak, English............	52	with grain 5 across do. 1·05	4·5	4·5	·75

Those marked thus * are doubtful.

COMPARATIVE STRENGTH OF CAST IRON.

CRUSHING.	TEARING.
2½ times as strong as Wrought Iron	⅓ the strength of Wrought Iron
33 ,, ,, Portland Stone	17 times as strong as Portland Stone
10 ,, ,, Aberdeen Granite	20 ,, ,, Aberdeen Granite
217 ,, ,, Brickwork in Cement	206 ,, ,, Brickwork in Cement
17 ,, ,, Fir	1·16 ,, ,, Fir
11 ,, ,, Oak	1·4 ,, ,, Oak

COMPARATIVE STRENGTH OF WROUGHT IRON.

CRUSHING.	TEARING.
⅖ the strength of Cast Iron	3 times as strong as Cast Iron
13⅓ times as strong as Portland Stone	50 ,, ,, Portland Stone
4 ,, ,, Granite	57 ,, ,, Granite
87 ,, ,, Brickwork in Cement	588 ,, ,, Brickwork in Cement
7 ,, ,, Fir	3⅓ ,, ,, Fir
4½ ,, ,, Oak	4 ,, ,, Oak

By these tables, it will be seen how much stronger cast-iron is in compression, and wrought-iron in tension, than any of the other materials; but the advantage we should gain by substituting wrought and cast iron for them is greatly increased by the facilities they offer for using the material in the position where it is able to exert its full force. In one of the diagrams a solid wood beam is shewn; we see by the table that the ultimate compressive strength of fir is 3 tons to the inch, and the ultimate tensile strength 6 tons, whereas its co-efficient in cross strain is only 10 cwt., or 1-6th of its least capability. The reason of this apparent anomaly is, that the resistance of fir to being torn across the grain is 1-20th part of its resistance to being torn with the grain. The parts mainly resisting compression and tension are at the top and bottom, like the flanges of a girder, and the remaining substance is required for transmitting the strain to the bearings. Could the stuff be so arranged that the strength of the wood could act most advantageously, a girder might be formed of the same length and depth and twice the width, that would bear, instead of 29, about 77 tons; and if we made a girder with the same stuff 3 feet deep and the same width, it would carry 244 tons. This, however, cannot be done with wood; wood chips are useless, and we cannot build a girder, on account of the narrowness of the stuff, its weakness when in compression or tension across the grain, and the difficulty of properly connecting the parts. To obtain depth, we must make use of an open-braced girder, as shewn. The breaking weight of this girder might be greatly increased by using iron shoes and pins, and by carrying the ends of the braces above and below the flanges, but the utmost weight we could safely put on this would be nine tons. Fir will indent with half a ton to the inch, and the pins will tear out. In iron girders, whether cast or wrought, we can so place the material as to act with the greatest efficiency. Girders of cast iron can be made from twenty to thirty feet long, and have the flanges at least duly proportioned, the waste of material being generally confined to the web, which has to be made of greater thickness than is required to prevent tearing from unequal cooling; with wrought iron we can construct girders of almost any length we require, the web may be made of the exact thickness required, stiffened where it is wanted, and thoroughly connected with the flanges by riveting. There is an absurd prejudice against riveting or bolting; the newspapers were full of complaints and warnings about the danger of this manner of connexion in one of the new bridges, but when the resistance of any material to any particular force is well ascertained, and is properly proportioned to the strain, no greater security can be offered; the shearing strength of wrought iron is better known than its power to resist crushing; in short, we have more accurate information as to the strength of iron than of any other material, and it is as reasonable to object to the use of pins, bolts or rivets, because they may possibly shear, as to the use of a stone or brick pier, because it may crush, or to a king post because it may tear.

The strength of iron in flexure may be advantageously compared with that of brick, stone, or timber. Iron can be cast hollow or made up in such a form as to employ the material in the most advantageous way, whereas the other materials must be used in a solid form; and although for the purpose of comparison of bulk with equal strength (breaking weight 444 tons) I have shewn a solid iron column with the brick pier, yet in practice, a hollow column would have been used, one 12-in. in diameter and of 1-in. metal would have occupied less than a square foot, have had 34½ instead of 50 in. of metal, with a breaking weight of 1000 tons. Iron cannot be advantageously compared with timber for girders and posts, where moderate weights and moderate lengths only are required, except on account of its being incombustible, and not so subject to decay; but it can be very advantageously compared with brick or stone work, both for bulk, weight and cost, and as it will take almost any form we please it is so much more convenient. It can also be put together so readily that an iron building might be erected in half the time required for one built with the ordinary materials.

As a material for the construction of houses, iron offers the inestimable advantage of being incombustible, could we then eliminate the woodwork, we should not only be saved the annual expense of insurance against fire, but relieve our minds from the unpleasant thought of being burnt to death. I believe that some kind of incombustible fibrous slab might be used as wall linings, but as yet we have no substitute for flooring boards; though cast iron is incombustible, it is not fire-proof, it shares this disadvantage with wood, stone and brickwork in cement, in short there is nothing absolutely fire proof but bricks and mortar. In churches, houses and workshops, if the roof, walls and floors are made incombustible, the damage to the structure from the mere burning of furniture is small, and it is only in warehouses, where large masses of highly combustible substances are stowed, that the necessity for a perfectly fire-proof material is felt. Cast iron has hitherto been used for supports, on account of the saving effected in space, and although wrought iron is fire-proof, yet from its liability to bend when red hot, we have not had sufficient experience to know whether any great advantage would be gained by using it. It appears to me that by using a shield of thin wrought iron at some distance from the cast iron column through which the air could freely pass, or by filling in the space with plaster of Paris or powdered charcoal, we might probably prevent the melting or breaking of cast iron supports, and no doubt, as we get more experience, we shall be able to get wrought iron stanchions and girders made in such a way as to have sufficient strength to prevent them from twisting or crumpling up when heated red hot.

One of the objections to the use of iron is its rapid oxydation when exposed to the weather, this rusting is not only offensive to the eye, but where thin wrought iron plates are used, would rapidly destroy them, and we have consequently to paint the exposed surfaces. But why could not cast and wrought iron work be covered with glass or porcelain enamel? we might then have the external iron work thoroughly protected from the weather, and ornamented in gold and colour.

Another objection to the use of iron, though perhaps less than the former, is the large amount of contraction and expansion caused by the change of temperature; when iron is fixed in conjunction with other materials not so much affected by the change of temperature as with brick or stonework, the walls are pushed out of the upright, and the adjacent parts are displaced, the joints of coverings and gutters open or tear, and allow the wet to enter; and should any water find its way between bearing surfaces or into hollow places from which it cannot escape, it freezes in the winter, the bolts are torn off, and the casting broken; to avoid these inconveniences, great care and attention only are required in so arranging the work that the joints are well covered, that due space is left for expansion and contraction, and that the ironwork is not too firmly attached to materials that are not so much affected by heat and cold. The use of iron is rather objectionable in buildings where the highest degree of comfort is sought for, on account of its coldness to the touch in winter; and in very damp and misty weather the vapour condenses on it, and the wet will in some cases run down columns and form small pools of water on the floor, or drop from the points or sharp edges of girders. I do not think that it is much worse in this respect than painted plaster on walls, but it is a defect to which I thought it right to draw your attention.

There is great difficulty in getting the ornament on cast iron executed with sufficient sharpness when it is to be seen close, and of getting sufficient effect when it is to be seen at a distance. Although pierced work may be readily cast when it is applied to flat surfaces, yet any part that is undercut presents great difficulties, is very expensive, and is very apt to be badly done. Unless small ornaments, whether sunk or raised, are made a considerable distance apart, the sand gets broken down and the parts run together. When pierced work is used in the web of girders, where the bottom flange contains much metal, it is most difficult to arrange. If the flange is made wide it looks unsightly, and if narrow the bulk is so great, as compared with the web, that it is apt to separate. The ornament has also to be arranged in such a way that its parts may act as braces to bring the two flanges into play, and as the tensile strength of cast iron is small, these parts have to be large toward the end of the girder, and should they be so designed as to prevent the strains being properly conveyed to the bearings, failure inevitably takes place. The lugs by which the parts are connected require great study and contrivance to prevent them from being so unsightly as to spoil the whole effect, and the bolt heads and nuts if made ornamental are very expensive, and if the common bolts and nuts are used they give a coarse and unfinished look to the work. But the crowning difficulty lies in ornamenting columns. Horizontal flutings may be made with ease, but any kind of vertical fluting or ornaments are cast with the greatest difficulty, and foliage in high relief cannot be executed; the difficulty has hitherto been solved by having the capitals plain, ornamented in very low relief, or by screwing on pewter ornaments. No one can desire to see the capitals of columns ornamented with artificial flowers, pinned on like those in a lady's bonnet; but the difficulty of introducing any ornament that shall be effective at a distance is very great. We know that the strength of a column is greatly increased by having a flat disc at the top and bottom, but even were this not the case it is almost always necessary for the purpose of connection with the work borne, and consequently the capitals and bases cannot be cast separately and dropped on. The plan I have generally adopted has been to cast projections, and on these to hang openwork veils, or to cast the cap in pieces and bolt it together. I have mentioned this, as on first designing ornamental ironwork we are apt to think of the undercutting in fenders and grates, and the excellence with which the ornamental parts are executed; but as a great number of them are cast from the same pattern, it is generally made of brass or metal, the undercut parts in small sections, and then these are picked out piecemeal from the sand, the expense altogether preventing such means being employed where a few castings only are to be made from the same pattern, and being in my opinion wrong in principle. I would recommend the Queen's gold medal being offered by the Institute to any one who could design an effective cast iron capital that could be readily and cheaply cast.

Wrought iron has hitherto been left plain, no attempt has been made to ornament it on account of the expense of working or cutting it, and so long as architects use wood, stone, or plaster, to cover up their girders, columns, &c., when they wish to make them ornamental, and the public are indifferent whether they are ugly or not, very little can be done, unless some cheap means of enamelling can be applied; although they might be readily ornamented by having patterns punched in the web and by notching the edges.

In a large city like London, certain portions about the markets, or which form centres of particular occupations, are more and more sought for, as the population multiplies and trade increases. The land on which the houses stand rapidly rises in value, as a greater number are anxious to share in the advantages which such particular sites offer; accommodation is partly obtained by the absorption of the adjacent houses for the purpose of the peculiar trade; still the greater the absorption the less advantage is offered, as one of the main objects is the saving of time in the distance to be traversed from the market to the shop or counting-house, or from one man's shop to another.

Rent has to be paid for the use of the land, whether profitably occupied or not, consequently the saving of space is an object that should engage our utmost attention, this is partly effected by throwing small buildings into large ones by which a saving is effected in the space unprofitably occupied. What I mean by the space unprofitably occupied is that given up for walls, partitions, staircases, and as areas for light. Supposing that land in the centre of the trading part of London is worth only £5. a foot, although in some cases it is worth £30. a foot, then each foot converted from unprofitable into profitable space would, at 5 per cent. save only 5*s.* per annum; but as each foot of land has at least four profitable stories over it, we should gain probably five times that amount in rent, besides the incidental saving in time, shoe leather, wear and tear of the body and irritation of the mind. So that I might not overstate the case I have taken, as an example, a house I have lately built in the heart of the City, about 16 feet wide, 27 feet deep, and 51 feet high from the pavement to the top of the coping, its area is 426 feet, and the space occupied by the walls about 93 feet, or rather more than 1-5th of the whole area; we might construct these walls of iron only 4 inches thick, or reduce the unprofitable space from 1-5th to 1-21st part of the whole area, by which we should effect a saving of about £90. a year in the rack-rent, supposing that the iron could be executed at the same cost as brick or stone. The house is lit by a narrow street in front and by an area at the back. One of the usual disadvantages of city houses is the want of day-light, and this light can only be obtained by enlarging the windows. I have shown in the diagram a brick front with the ground floor all window, the first and second floors with windows 8 feet wide and 9 feet high, and one 8 feet wide and 6 feet high for the top story, windows larger than would be used: the area of void is not one-half, while in the actual back front, which consists of iron girders and columns, the void is nearly 3-4ths of the whole area, or the gain is 218 feet of light.

It has lately been pointed out to us that we are recklessly extravagant of the coal which we possess, by burning it in such a way, as only to consume a small portion of it, wasting its heat and filling the air with soot. By using the hollow iron party walls as flues, we should not only be able to warm our rooms better, and at less expense, but be saved the annoyance and waste of time of attending to fires, and, possibly save the cost of insurance.

I have hitherto spoken only of houses used for the purpose of business, to which little damage can be caused by fire if the main structure of the building is wholly incombustible, but in warehouses, where large masses of highly combustible substances are stored, the question of the saving of space has to be set against the risk of fire. In this class of buildings, as I before mentioned, economy of space has caused the use of iron for supports, and the walls, generally bear a much smaller proportion to the whole space than in houses, and have to resist a lateral pressure, as well as to protect from fire. Whether we could find some material to fill in between iron walls that would not conduct heat, or whether a free current of air would answer the purpose, I will not attempt to decide; but, at present, I could not advocate the use of iron party walls in warehouses.

Having now pointed out how we gain in space, in security from fire and in lightness, over the former methods of construction, I must say a few words on the general adoption of iron buildings. The public are getting more informed on the subject, and now very generally insist on the use of iron in buildings, for the purpose of gaining space and light—even basements are rarely vaulted without iron being used, to prevent the loss of space in the rise of the arches and the thickness of the vaults—and as soon as they are aware that architects merely use the old materials because they will take the ancient forms, they will refuse to allow valuable space to be occupied, and light to be excluded, because architects wish to exhibit this or that style which originated in the necessity of excluding the light and heat. So greatly has iron intruded itself, even on our profession, that one rarely sees a large building being erected without iron columns and iron grders: if, then, these are introduced, what excuse can be made that the work is not logically carried out, and iron adopted in every part where it can be successfully applied? It is only because proper attention has not yet been given by architects to the material. It is in vain to say that it is because of its liability to decay, for if it is introduced in columns and girders, the decay of these will as soon ruin the building as if the whole were constructed of it, and whether the profession choose to frankly accept it or not, I feel assured that it will come, sooner or later, into general use, and it is better for us to yield with a good grace to inevitable necessity, than to be gradually superseded or forced to use it by those whose judgment we consider inferior to our own.

If any architect of this day has any new and beautiful conception that he wishes to hand down to remote generations, by all means let him employ brick, or brick and stone exclusively; let him vault his floors and roof, if he can get the space required for the abutments, and the cost of the additional height; but to those who are engaged in works of more immediate utility, and whose ideas are not of such transcendent merit, I would recommend the use of iron, and to use it properly it must be studied, and the study of it will be found most absorbing and fascinating, and quite as much care and foresight will be required as for any material that has yet been used.

Having now pointed out the advantages that iron offers, and the main difficulties that have to be conquered, I would call your attention to its adaptation for the NEW STYLE, about which so much has been said, during the last few years, and so little has been done. It is, doubtless, true that the English nation is not one of the great artistic nations that have, from time to time, come forward with a new style, or a new adaptation of an old one. Although we have equalled the best in our literature, and surpassed them in our mechanical inventions, it appears that we have never led the way in pure art, yet there is a certain amount of artistic invention amongst us, and if this were turned in the right direction, we should certainly produce something original, and possibly something good.

I cannot say whether the general want of appreciation of beauty is a natural defect or merely the legacy left by former generations, who not only did not care for beauty, but even endeavoured to destroy all natural admiration of it, or, at least, to repress such a feeling as a suggestion of the evil one, but towards the end of the last century all real artistic invention seemed to have completely died out. At present there is a great stir about the Arts, but when we look around us—beyond the very small circle who are engaged in them—we not only see everything hideous, and every one contented with it, but we trace a sort of process by which everything that is beautiful and picturesque is gradually but surely, being extinguished—the labours of the field are performed by hideous engines; the commonest household services are being done by machinery. The moors, heaths, commons and forests make way for fields of cabbages, mangel wurzel and potatoes—trees and hedges will shortly be extirpated. All splendour in dress is laid aside, and we may expect to see the materials of clothing so improved and cheapened, that the labourer in his best clothes, and the king on the throne, shall be almost undistinguishable. Processions and Civic pomp are doomed; warfare itself is becoming as unpicturesque as civil life, and our future navies, if seen at all above water, promise rather to remind us of the porpoise than of the nautilus. Sculpture and painting have ceased to have any marked influence on mankind, and only put up a sort of protest in favour of beauty, but which, for the most part, must be clothed in the forms of past ages, or other countries, to make it palatable. Although this may not be the time for art, yet I think that, as gracefulness of form, and beauty of colour, pervade the greater part of Nature's works, we may *still* endeavour to render buildings agreeable to the eye. It must, however, strike the most unobservant that ornament is looked on either as an advertisement, or as a humouring of the prejudices of the vulgar: and every part that is supposed to be hidden from the public eye is not only left bare of ornament, but is made without regard to anything but convenience; still, looking at our civilisation and our tastes, I think a purity of outline and elegance of proportion, with an almost total absence of ornament might gradually be made to pervade everything, from our buildings to our tea spoons.

Whether the age is distinguished for its powers of artistic invention and good taste, or whether it is destitute of them, is a question on which there may be different opinions, but can any one who has thought on the subject believe in the propriety of dressing up the buildings of the present day in the architectural forms and ornaments of former times? If architectural art is anything, it must not only make the required forms beautiful, but of that form of beauty which the taste of the age finds most suited to it. This may be said of every art, but the conditions of architectural art force this truth upon us. A Protestant church of this age has very different requirements from a church of the middle ages. We do not want it for processions, but for hearing the service. The tower no longer is wanted for beacons, nor does the sound of the great bell call the parishioners to arms, and bell-ringing is no longer a general pastime. Even greater alterations have taken place in the requirements of other public and private edifices. New materials and new methods of construction are introduced, so that the forms which former ages used can no longer be adopted with propriety, even though the ceaseless craving of the mind after novelty did not demand an alteration.

We admire the exquisite art of the Greek temples; but they only excite our contempt and ridicule when executed here in the present day; and, although the copies or paraphrases of building in the later styles may be less sublimely ridiculous, they produce in our minds an exactly opposite effect to the originals. In the originals we see an expression of the thought, and taste of the period; in the copies we only see the want of both. If we were asked whether a people who had discovered twenty new sciences, who were quiet, orderly and peaceful, averse to outward show, with a peculiar literature, rather unbelieving than bigoted, the bulk of whose work was done by complicated machinery, worked by steam and electricity, would adopt the architecture of an age in which science was in its infancy, whose people were turbulent and quarrelsome, in whom the love of war was a predominant passion, almost devoid of literature, passionately fond of outward show and personal adornments, who wore armour, and in whom personal prowess was one of the greatest virtues, credulous as children, bigoted, cruel, with a few simple machines and instruments, and who knew of no powers but those of the wind, water, and animal strength, should we not indignantly reject the idea? But such unfortunately is the case, and archæology has usurped the place of architecture. At first sight this may appear a matter of small moment, but, in reality, it cuts at the very root of true architecture, and has made it a mystery of which only the initiated can judge. It has disgusted the bulk of the people, who take the same interest in it that they do in heraldry; it has crippled the natural powers of the architect by throwing his energies into a wrong direction, forcing him to waste his time in learning what other men have done in other countries and other ages, and leaving him helpless to deal with new forms and new materials in this, and far behind in the rapid progress of new methods of construction—the great body of the people have treated him as a trifler and a pedant talking a language they did not understand, and a new race of architects have sprung up, who, pushing him rudely aside, have thrown art and beauty to the winds; and under the name of engineers, and the protection of science, have carried construction in the new materials to a point of marvellous excellence, and have filled the world with abominations of ugliness.

So long as we profess to be architects, so long do we profess that we are able to give beauty to the necessary forms that new wants, new adaptations, or new materials require, but so long as the present engineering monstrosities cover the town and country, we confess that we cannot substantiate our pretensions. I do not wish to be misunderstood. I do not deny that we could put the ugly construction into an ornamental box, or, leaving its hideous outline, ornament it with triglyphs or cusps, but we cannot make the thing itself graceful or elegant. The Greeks clothed their rude construction with a beauty we still admire. The architects of the 13th century not only made a revolution in the art of construction, but threw their new construction into new forms, and covered it with new ornaments; and not only succeeded with their chief buildings and cathedrals, but made even their military works picturesque; and the admirers of that style praise the beauty of their bridges, their parish churches, their private dwellings, and their domestic furniture.

Has then the human mind deteriorated, and are we incapable of making our new constructions beautiful or picturesque? Is the saying of Victor Hugo true, that printing has killed architecture? I trust not; our engineering works and our mechanical inventions shew us that in these respects we can rival the middle ages, and I fervently hope that we may find that it is only through a sort of infatuated perversity that we are now so wanting in artistic invention. The conservatism of mankind is so great that it is only at certain periods of intellectual convulsion that men will dare to doubt and think. Doubting is the first great intellectual virtue, which apparently few architects have reached. The happy invention of Palladio has given us a dispensation from thinking. The sculptor architects of Italy had admired the fragments of antique sculpture that were continually being found, and had endeavoured to transfer some of that elegance and grace into their buildings, but it struck Palladio that if so much grace was given to buildings by a little study of the antique, how beautiful they must be if they were copies. The same happy induction as that of the Irishman, who made his apple tarts all quinces. From that time architecture has been blighted by a servile desire of imitation; we have tried Egyptian, Greek, Roman, Byzantine, Romanesque, Gothic of all periods, Italian and French Renaissance, revived Roman, Arabic, Chinese, and other styles. Let us now throw aside all our old traditions; let us hold in abomination the five orders, coronas, triglyphs, curled cantalivers, the egg and tongue, and the acanthus-cusps, crockets, and the pointed arch; and if we have no taste or artistic invention, let us boldly confess it, and be proud of saying—"An ill-favored thing, Sir, but mine own."

Mr. William White (Fellow) had much pleasure in proposing a vote of thanks to Mr. Aitchison for his paper, although there were many points he had brought forward with which he could not coincide. Nevertheless, the whole matter of cast and wrought iron had been placed before them in a thorough and, as he thought, impartial manner. Mr. Aitchison had shown them the necessity for a different treatment of cast-iron from that of wrought-iron, and the necessity for different manipulations for each; as also the superior strength of iron over every other material. All this he had duly pointed out; but he did not think that the application he had made of this material would in all respects commend itself to the general feeling of the great body of architects, for this reason: Of course iron must be looked upon, as it always had been, as one of the many materials to be used in building; but if he understood Mr. Aitchison aright, he proposed it as a material which was to a great extent to supersede the use of almost all other materials in building. As regarded the construction of a great many buildings where vast size, lightness, and strength combined were required, there could be no doubt iron must always enter very largely into the material for such buildings. Nevertheless, he thought Mr. Aitchison had plainly shown them, on the other hand, that in that especial branch of building which was in its true and proper and highest sense "architectural," iron was unsuited. ("No, no.") He expected to hear "No, no;" but he thought Mr. Aitchison had not yet shown them that for every purpose of ordinary domestic use—and for every purpose for which the great majority of buildings were erected—that iron could be the most available or most comfortable and useful when employed, or that it was the least expensive material. He had walked through London, and he had not yet seen those numerous iron buildings arising in every street which they were led to expect from the promises of fifteen or twenty years ago from the development of iron architecturally. It was a matter to which he had given considerable attention. He had spent days, even weeks, at the forge and the foundry with practical men, and on some of these points he entertained strong opinions. Towards ten years ago, he had to put up a small private school chapel, and after hearing very learned disquisitions on the treatment of iron-work as to supersede everything else, he asked the gentleman who advocated iron to furnish the lowest estimate at which he could put up a building, fitted for the purpose and of the size required. It was not a large structure in which great space and light were required, but only a small place, where a few people could meet together with warmth, comfort, and some pretensions to architectural appearance,—and the lowest estimate for producing the very simplest effect in iron was between twice and three times its actual cost in brick and stone. He must put out of sight that desirable—not to say essential—architectural appearance for some time. They were told that architectural appearance was to come; but Mr. Aitchison had shown that, so far as the present was concerned, the nature of wrought and cast iron was such that it was not fitted for daily use, but only for large buildings or for buildings which required great reduplication. At present, he did not think they saw their way to putting up exterior walls of iron, and he had carefully listened, in the expectation of hearing mentioned some substitute which should be satisfactory for that purpose. It was true, the two casings of iron wall filled in as proposed would, to a certain extent, keep out the changes of atmosphere, but not at all perfectly. It might be more effectual in changes of temperature; but these affected the atmosphere more with iron than with other material. The great and rapid condensation of vapour alluded to in the paper might to some extent be got over, but he did not think they could well have the outside face of the walls cased with iron, which must be protected either by an anti-corrosive process or by enamelling; nor did he think it would be comfortable or even healthy to do so. He had conversed with many medical men on the subject, and they had generally endorsed his opinion that the porous nature of brick and stone was one of the greatest advantages in buildings in a sanitary point of view. In a little book which most present had probably read—"Miss Nightingale's Notes on Nursing"—it was stated that the use of glazed tiles inside and outside the building was a preventive against infection in epidemic diseases, the retention of unpleasant odours, miasma, and so forth, from being in no degree porous, and so being less absorbent of infectious vapour and more easily wiped and cleaned. Whereas, in truth, absorbence was in one respect a great safeguard; if every particle were left volatile, clothes and persons would be more readily susceptible of ill effects; and the walls acted, as it were, as a filterer to the house. Then, again, as to the alternative of exaggerated spaces for windows, as shown on the exhibited drawings in lieu of wall space: that amount of window space required an amount of glass, which was equally liable to the objection he had spoken of with regard to the changes of atmosphere and temperature, which might render a building untenantable for domestic purposes.

The PRESIDENT (Professor DONALDSON) remarked that the application of iron had been recommended only in buildings for commercial purposes in confined localities—not for family residences, as he understood the paper.

Mr. AITCHISON, Fellow, did not suppose that iron would be used in the way he had pointed out, where space was not a consideration.

Mr. WHITE said, if iron was to be used only for warehouse purposes, his remarks fell to the ground; but in other parts of the paper he thought that was not the exclusive application of Mr. Aitchison's remarks; else all those remarks relating to domestic and religious buildings, and the new school of architecture, would have been superfluous. As regarded his remarks upon the use of iron as calculated to give rise to a new school of architecture, he thought many members present would hardly fall in with what had been advanced on that subject; for the very nature of architecture, and all the ideas which had hitherto prevailed throughout the world, had been based on super-position. The materials of stone and brick were the only ones that were available for every village domestic use by the great majority of English workmen. Of course these applications of iron might be prepared in foundries, sent out, and put up; but he did not think it was in the nature of things that the ordinary forms of construction in architecture would be superseded by the material which Mr. Aitchison advocated. As to his remarks upon religious architecture, he hardly thought that part of his subject relevant to the matter in hand; and for that reason he should not offer some observations which he contemplated doing when he first listened to the remarks of the paper. He begged to propose a vote of thanks to Mr. Aitchison.

Mr. Baker, Associate, requested Mr. Aitchison to explain the section of the ⅄ girder, as he had stated there was great difficulty in casting undercut work. From the drawing exhibited there appeared to be an immense amount undercut, and it was nevertheless apparently quite a practical piece of work.

Mr. Aitchison (referring to the drawing of the ⅄ girder) said it was a form of girder which was used by his father nearly twenty years ago in, he believed, the first incombustible building of iron and brick that was put up in London.* It was then considered a very effective girder, and he believed had been previously used; but since that time more was known about girders, and it was now found to be a very bad form, irrespective of the difficulty of casting, as a great proportion of the metal was put in a position where it was almost ineffective. This girder was known as the Y or skew-back girder, and by putting the metal of one side of the ⅄ into the bottom flange, it would act with the whole depth of the girder, instead of being applied comparatively near to the neutral axis. The difficulties in the casting were so great, that the founders frequently undertook to make the girder deeper, and to put in a larger quantity of metal, if they were allowed to omit the top flange, so that it might be cast bottom upwards when the pattern would draw. He added that this form of girder was now almost totally exploded, and was never used except under particular circumstances where it was found convenient to do so.

Mr. Morris, Associate, concurred in the statement just made, that this form of girder was not much introduced in practice; at the same time, it possessed extreme strength of body to resist tension.

The President remarked, that of course if they wanted to give additional strength they would increase the bottom flange; the shape adopted was for the purpose of giving a skew back.

Mr. J. W. Papworth, Fellow, would inquire why a Y girder was necessary, when a simpler section (such as he described on the board) would answer all the purposes required? that was adopted when he was a boy, and he had never known it fail. He had great pleasure in seconding the vote of thanks to Mr. Aitchison, although he was entirely opposed to the views expressed by the proposer of the motion; and was proceeding with the expression of his own sentiments upon the paper, when, in accordance with the request of several members, the President announced that the discussion of this paper would be resumed at a future meeting.

Mr. Kerr expressed a hope that some of the ornamental drawings by which the paper was illustrated would accompany the publication of the paper in the "Transactions."

The President said, that Mr. Aitchison would place the drawings at the disposal of the Institute for that purpose, and they would be selected and reduced to a practical size for printing with the paper.

The meeting then adjourned.

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* Irongate Wharf.

THE SKY-LINE IN MODERN DOMESTIC BUILDINGS.

By A. J. B. Beresford-Hope, F.S.A., Hon. Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, March 14th, 1864.

There is no one here present, I should imagine, who has not often found himself gazing at the river front of Somerset House, as he whirls in a Hansom over Waterloo Bridge. With what feelings each of us may have looked upon that famous building I cannot tell. Personally I must, with all deference to its eminent architect, say, that to my eye it offers an instructive combination of strength and weakness. As laid out within the four great straight lines of base and balustrade boundaries, the composition deserves the highest praise. But although those lines comprehend the entire area over which Sir William Chambers seems to have imagined that the art of the architect extended, they do not include essential portions of the building, which not only exist in actual construction, but which are powerfully conspicuous to the passer-by. I do not allude so much to the cupola designed to cap the centre, and on that account barely adequate, as the crowning mass of the entire river front, as I do to the mean looking roof, with its innumerable fantastic array of hideous chimney pots and chimney tubes. I anticipate the answer that will be made to these strictures. I shall be told, in the first place, that the chimney pots and tubes are no part of Sir William Chambers's own work; and, secondly, that when he built Somerset House he had no idea that it would be overlooked by a bridge in immediate proximity, and so that he contrived a parapet and a roof mutually intended to mask and to sculk in presence of the critics in the wherries; the point of view from the surface of the Thames itself being the one about which he was most concerned on that side. I readily accept this defence, because it concedes the position which I desire to occupy. Somerset House, by the confession of its warmest admirers, is not a structure built for all circumstances, nor to be seen under all points of view. Something, therefore, must have been wanting in the artistic repertory of its architect, which has so far made it defective. What that deficiency is will be the object of this paper to unravel.

But before we enter on the main question, let us for a few moments contemplate, as a strong contrast to Somerset House, another famous pile overhanging the river of a great capital, and the more so because the building, as I know it, is now a thing of the past, the Pavillon de Flore at the Tuilleries, which is being re-built, perhaps beautified, if so, more's the pity. The old Pavillon de Flore, of the style which intervened between the absolute Renaissance and that of the seventeenth century, was grey and grim, but very stately, rising over the Seine like a keep, with its steep self-vindicatory roof, and its solid tower-like chimneys. Criticise the Pavillon de Flore as you like, you feel that it was real, palatial and grand; the reason is, that the very points on which Somerset House is most weak, are the distinguishing characteristics of the Parisian structure. In one word, at the Pavilion de Flore the *sky-line* was foremost in the architect's mind—at Somerset House it was entirely overlooked.

In treating of the sky line in modern domestic buildings before this Institute, I shall regard the subject from an architectural rather than a merely picturesque point of view, not merely enquiring what forms of sky outline are most agreeable to the eye, but also pointing out what method of construction conduce to the creation of those forms. I have been induced to take up this subject from the pleasurable conviction, that out of the battle of styles has grown up on both sides a genuine desire to be real, and to make the most of, instead of masking and playing tricks with, all features of construction. I shall not wander into controversy by arguing which side gave the impulsion towards this reform. I accept it the more readily as it allows me to discuss the first principles of the domestic sky-line, from data which will equally be accepted by the classicist and the Gothicist. At the same time, the limits of a paper only allow me to skim the question, while many considerations of the highest interest, such as the influence of local scenery on local architecture, must remain unhandled. No doubt the general appreciation among architects of our own time, of the need of a true sky-line created by the building itself and not by any fantastic excrescences perched on the cornice, is but the revived perception of a truth of which, as we have seen, the architects of the Valois and the Bourbons realized as keenly as those of St. Louis; but it is one which had been so much forgotten in England under the influence in our towns of architects of the Chambers and Adams school, and in presence of the numberless builder-built country houses, whose stuccoed hideousness deforms some of our fairest parks, that I claim for its revival the merit almost of a promulgation of a new truth. I disclaim any imputation of irreverence when I say that this principle is most aptly prefigured by the Apostolic illustration "and to our uncomely parts we give the more abundant comeliness." The precisionist school seems to have arbitrarily assumed that certain portions of a building, the roof that carried off the water and lodged the domestics, and the chimneys that carried off the smoke, from the presumedly menial functions which they fulfilled in the economy of the mansion, were and ought always to remain uncomely; so the roof was kept low and almost out of sight, and the cornice or balustrade tilted up before it, with just room for the open intervening gutter, in noble disregard of the damp, the smells, and the darkness thereby inflicted on the persons whose ill luck compelled them to sleep there; and the architect stopped his chimneys short at a tiny distance above that low pitched roof, leaving it to the smoke-doctor to convert the neither beautiful nor useful thing, which he did not blush to call chimney, into something else still less beautiful, but more useful, which might in some degree do that for which chimneys were originally invented—carry off the smoke.

The older architect, appreciating, by reason or by instinct, that as in God's architecture of the mountain and the forest, the peaks and the tree tops, standing against the sky, give character to the entire landscape, so in man's architecture the sky-line must be studied if the structure is intended to be complete and successful. What if the uses of the upper parts of the house are not so dignified as those of the lower floors, still they are needful, and it is with these that he has to make the sky-line, and therefore was more abundant comeliness given to the attic and the chimney, and together with their comeliness more thorough usefulness, inasmuch as the attic gained light and air and headway, while the conspicuous chimney proved equal to its appropriate office.

A short retrospect will show that I have not been unjust to our classical architects of the middle of the last century, in charging the neglect of the sky-line chiefly upon the influences of their teaching, too readily responded to by the ignorance and the cupidity of the builders. The attention which the Mediæval architects of England paid to their sky-line needs no proof. It is as visible in the castle as in the minster, at Carnarvon as at Lichfield. It is equally visible in the farm house and the oak-framed cottage. When the growth of civil organization consequent on the termination of the War of the Roses, and of the accession of the Tudor dynasty, had induced the smaller squire and the substantial yeoman to build for themselves larger and more durable mansions than their ancestors thought of occupying; then too the skill of the architects—most of them, it may be, obscure local men—seemed chiefly bent on giving an effective sky-line to the many-gabled hall or grange, whether of stone or of half-timbered construction. The vicious element in the Jacobean style, viewed in its mass and not in its details, was the insolent capriciousness with which it played with the sky-line, in many a fantastic gable. In turrets and in towers Jacobean was always clever, and often very graceful, and it ever made the sky-line its leading object.

When Inigo Jones, in the reign of Charles I, and Wren in that of Charles II, established for a time the supremacy of classical and Italian architecture, the newly fashionable style was handled with due regard to the sky-line. The finely broken façade of the Palace of Whitehall is evidence of Jones's regard for this essential feature. Wren's appreciation of the sky line stands confessed in the forest of London steeples, so marvellously diversified as a whole—each so ingeniously put together—all clustering round the central dome of the vast cathedral. It equally stands confessed in the curved outlines of Christchurch gateway, Oxford, in the massy tower of Warwick, and in the statue-capped library of Trinity College, Cambridge. To turn to the works of lesser men in the last years of the seventeenth and commencement of the eighteenth century, who can say that there is no feeling for the sky-line in those snug red-brick houses, with developed roofs and solid chimneys, of which we still see so many specimens basking at the outskirts of our quiet country towns, inside their walled and fruitful gardens!

If we study the grander buildings of the earlier eighteenth century, zeal for the sky-line assuredly inspired the palaces of Vanbrugh, Castle Howard and Blenheim, and the churches of Hawksmoor, such as St. Mary Woolnoth and St. George's in the East, which heavy though they may be called, are the genuine products of an original and masculine ability. It was, I say, reserved for the architects of the middle of the eighteenth century to deal with the roof and its accessories, as if it were something unclean. The reason of this caprice does not lie very far off. They moulded their style upon models procured from countries which were not in so much need of artificial warmth as we are, and in which chamber accommodation was more scantily provided, and they were unable to vary their specialties so as to accommodate those wants of their age and climate, which actually pressed upon them. Yet there stood in evidence against them, not the spires and the gables merely of our Mediæval towns, but the temples and the towns of old Greece and Rome. That the sky-line was deeply studied by the ancient architect in his public buildings needs not to be demonstrated. The Acropolis of Athens alone is proof enough, crowning the steep rock with its towered fortifications, and fronting the sky with the stately Propylæa, the spreading and irregular mass of the Erechtheum, and the gabled Parthenon, all clustered round the colossal image of Minerva Polias, rising like a Flemish Beffroi, at once the visible central point and the tutelary deity of the city. The Capitol, and Mount Palatine, bear equal evidence. But how about private houses? I assert that there is proof sufficient to show that in spite of the small size, the inconsiderable height, and what we should now-a-days consider the meanness of those habitations, they were, nevertheless, built upon a principle of sky-line based on the effects of roofs, sometimes low pitched and covered with tiles, and sometimes flatly covered, combined with variations of height in the houses themselves, produced by the irregular superposition of stories, so as to impress the whole composition with an effect analogous to that which would be given by a large distribution of low towers.

No Greek nor Roman architect—had the problem of the multiplied wants of European eighteenth century civilization, and the uncertainties of an English climate been set before him—would have solved it, as we have seen that it was solved, by our countrymen, in the much abused name of classical antiquity. Where the architects left off the builders came in, and under their handling that *ne plus ultra* of dismal featureless ugliness was reached; the stock respectable English street-house, with its oblong holes for windows, and nothing visible of the roof, besides some dumpy chimney pots and some broken-backed metallic tubes. Perhaps there is one thing even uglier, and that is, this same stock house, respectably beautified with stucco or white paint, pediments run in compo over the windows, and a menacing slice of cornice stuck on in front. Happily we may now laugh at these things with a safe conscience, for we are on the fair road to a better state of things, though far, very far, I fear, from having made sure of that salutary reform. Architects have, I believe, all accepted the right opinion; but the builders, too many of them, are still impenitent. Of course those architects whose style was Gothic or Elizabethan, were the first to give in their adhesion to the apparent roof. But within these few years we have witnessed the conversion of those who cultivate the Renaissance. Renaissance being still the favourite architecture for London streets, the appearance among us of the artistic sky-line has been of recent date, but happily it has appeared, not only in such big piles as new hotels, and so on, but in many shops, and in some private houses. Still, as I said, the builders are, naturally enough, slow to rise out of the trade ideas, which they are so readily able to manipulate, and thus avoid the expense and control of an architect. So it is, that not only do we see the old type re-producing itself like a contagion, street after street, but we are doomed to witness erected on the pleasant hills of Sydenham and Norwood, and elsewhere, groups upon groups of semi-detached villas, all constructed on one type, and that the most offensive conceivable, springing up in clusters to spoil neighbourhoods lately so beautiful. I appeal to all present whether it is not worth while to do something to check this continuously advancing wave of a bad taste, which is already discredited without being extinguished. With all submission, I contend that the most effectual antagonism is the creation of a popular feeling for that general perfection and grace of outline in buildings (apart from detail or material or colour) of which the sky-line is a very, if not the most, important element.

The first step towards constructing is, to analyse the materials ready to hand for construction. What then are the elements out of which a good sky line may be created in a moderately sized single or double house, in town or country, or in a row of street houses? elements all of them more or less applicable, *mutatis mutandis*, either to Gothic or Italian. I use the word elements in two correlative senses, as signifying both the architectural forms out of which sky-line can be built up, and also the material portions of the building to which those forms are applicable. First—as to the forms, speaking most generally, the elements of the sky line may be classed as tower, pyramid or cupola—tower including all forms which rise with parallel sides, and a summit line approaching to the horizontal; pyramid all that rise with converging straight, and cupola all that rise with converging unstraight, lines. But for the purpose of this enquiry we must sub-divide a little more minutely, bearing all along in mind that the forms of which we treat must, inasmuch as their effect on the sky line is our immediate question, be regarded as indifferently belonging to linear or solid geometry, and that we may now and then find correlative constructive features, linear and solid, respectively answering to the same form.

The necessity for this distinction, which I fully grant is at first sight open to the imputation of over-minuteness, will be manifest if we recollect in how different an aspect the sky-line of a building presents itself when we gaze upon it at noon day, with the sun's rays searching out each nook and cranny, every moulding and every corbel, and when we view it standing out against the twilight of the sun already set, itself one single mass of inky violet, with nothing distinguishable but the absolute outline seen, as it were, in one plane. Of course, a good sky line ought to please under both these conditions. In the first case, all the forms which are circular, or cubical, will strongly assert their solidity. In the second, they will appear to the eye as simply linear.

The tower, whether square, polygonal, or circular, sufficiently explains itself in the primitive meaning of the word; as a form of the sky-line it also includes the ordinary outline of most houses, a story of one or more rooms casually raised above the remaining building, and chimneys generally. The tall circular stalks of manufactories must also be classified as towers. The pyramid is either obtuse or acute, and to it belong all roofs of a single pitch, meeting at a central point. Spires are acute pyramids, and the ordinary pointed gable is a linear pyramid. Conical roofs are also pyramidal in their outlines, and must, by rights, be referred to this class, although in sun light they have, in spite of their vertical section, much of the effect of the cupola, from the prominence which is then given to their curved element. The truncated pyramid occurs of a low pitch in the roofs of many houses, and of steep pitch in those

French cappings which have recently been incorporated into English architecture. Sometimes the truncated pyramid is made with uneven sides, so as to give a ridge and not a flat surface at the top, and to produce the appearance of a very sharp spire on two sides. A truncated cone has not yet been introduced into architecture, and I trust never will be. The apsidal roof of a church viewed perfectly direct is of course a cone. The steeple composed of a series of receding cylindrical stages, like St. Bride's, Fleet Street, will probably be best included in this class, and also the pointed roofs with sides curving inwards. The seventeenth century gable of Holland is not unfrequently a section of the last-named form. The cupola, in its original signification, explains itself. Classified by plan, there are circular and polygonal, and by section oblong, hemispherical, and oval cupolas; not to talk of the Russian form of a cupola pinched in at the tambour and expanding upward like an onion or some other bulb, of which there are such notable examples at the Pavilion, Brighton. There is also the four-sided cupola found in French buildings of the seventeenth century—notably in the Tuilleries. The mansarde roof, composed of two stories of different angles, had best be classified as a cupola, for in a haze, and to a short sight (the criteria of ambiguous forms) it looks almost curved. The curvilinear gable, so familiar to us in Elizabethan houses is, of course, a section of a cupola, and by our rule comes into this class.

After these brief explanations, I come to the point how to build or how to alter the average street-house of our towns, the smaller house of the country, and that peculiar suburban institution, the "semi-detached" couplet, so that they may, by means of their varied and graceful sky-line, be architectural ornaments, and not eye-sores to their localities. Form, and not colour, will be the exclusive staple of the enquiry, and so we shall not have to enter into the difficult discussion of the merits and demerits of polychromatic architecture. A few years since, before details had been as much studied as they happily are now-a-days, an attempt was prematurely made to adorn our suburbs, and the more genteel country neighbourhoods by what it was then the fashion to described as *cottages ornées*. But the extravagance of the woodwork nailed on to the gables, the flimsiness of construction which this meretricious show too often concealed, and the rustic narrowness of the windows (planned, I conclude, to be blocked with woodbine and eglantine) were effective and reasonable obstacles to the spread of a taste of which notable examples are still to be found in the outskirts of the metropolis, and in some well known watering places. The result was a retrogression of taste into the old typal forms; and so, while the highest and the lowest class of houses in the country have alike notably improved—because of the highest and the lowest class of houses, the squire or the clergyman is ordinarily the director, and the design comes from an architect's office—the intermediate grade, of which the builder is the designer and often the pay-master, remain at the old dead level.

A good sky-line may frequently be produced by the simple process of throwing up one or more rooms of the house one story, or sometimes two, higher than the remaining building, so as to compose a kind of tower; but in this case the roof of the lower portion ought never to gable *obtusely* parallel with the side of the tower, though if the house is in Gothic, an acute gable will not be displeasing. In all styles a lean-to, a flat roof, and a gable, either acute or obtuse, at right angles to the higher portion, will group satisfactorily. This suggestion refers, as it is hardly necessary to note, exclusively to a country house, or at least not to one in London; and I have begun with it because it has most directly to do with the fabric itself.

To come to the roof: almost all forms of roof, high pitched or low, ridge and furrow, or pyramidal, mansarde or straight-sided, gabled or hipped, are good in their place, except one form, which is the favourite with the country and suburban builders,—the one which stares you in the face like an obtuse truncated pyramid. When you have to deal with such a roof, you can only carry it off by the accessories, or make it anew; in itself it is hopelessly mean; and to those who are imaginative enough to see physiognomies in house fronts, it conveys the idea of mental imbecility, with its low receding brow, and the shapeless windows, goggling and blinking underneath like big stupid eyes. For my own part, I do not at all dislike that peculiarly Italian roof—the *very* low-pitched complete pyramid, if only the eaves are broad, and if it be covered, not with slates, but tiles, the bigger and coarser the better. A roof really high enough to contain and cover-in good rooms, with bold dormers, is no longer a novelty in our cottages. Into the small or country houses of this century it has hardly been introduced, common as it was in Queen Anne's reign. You see I have propounded as possible and good in their respective ways two very different types of roof for my house in the country. I pass over gables, either of the austere Gothic, or the frolicsome Jacobean family, simply because I take them for granted; they are the most obvious, but not the only, often not the possible, way of creating sky-line. There is no reason, under special circumstances, that the same roof may not in the same house abut at one end against a gable, and, at the other, slope down as a visible roof on to its eaves. While talking of gables, I must advert to the variety often given to the sky line by hipping them. There was a time when I had no fancy for hipped gables, but long familiarity with them, in the district in which I habitually live, the Weald of Kent and Sussex, where they have been and are in habitual use ever since the middle ages, has brought me to the belief that there may be a refinement and a softness in a hipped gable, of which the straight gable is destitute. It is certain, that while the sky-line of an ordinary gable, viewed directly sideways, is simply that of any other wall with a roof abutting on it; the similar contour of the hipped gable offers a special pyramidising outline. Mind, I am only arguing for hipped roofs in their right places, and, generally speaking, for hips which do not slice off very much, and which are roofed with tiles. The gigantic hipped transepts of a large German church do not find their advocate in me.

How many of these suggestions, as to the roof, are applicable to the semi-detached house? All, I answer. The recommendation of the low pyramidal Italian roof, if only it be conceded that the two members of the couplet need not be exact matches, and above all, that it need not be built so as to sham one mansion with a single pitch of roof and with the division wall running right through. Under such circumstances, such a roof would be a monstrosity, not to talk of the difficulties as to the chimneys. But why, for example, should not one of the houses exceed in height and be built three stories high with that roof, and the other be lower and more extended, with a roof admitting of dormered attics? The really great difficulty in all probability which would dog the steps of the builder intent on giving variety of outline to his semi-detached house, would be that unless one side looked just like the other, the respective tenants would mutually, though diversely, come to the conclusion that the other side was better distributed, and growl accordingly at the parity of rent. The way to meet this, which occurs to me, would be boldly, and on principle, to couple together in each group, houses of different rentals. If the builder has to run up a dozen houses at eighty, and a dozen at sixty pounds a-year each, it cannot make much difference whether all of each price pair off, or whether each higher priced house finds itself married to one of an inferior rental. But after all, and this is the melancholy feature of the case, until the wives of England are better grounded in artistic principles, the fight must always be uphill. Such houses, occupied as they usually are, by men of business, are no doubt usually looked out, and usually looked after, by the wife; and I fear that to the average wife, the average house has a familiar and agreeable aspect.

The roof of the town house is generally a simpler problem to handle than that of the country one, because the opportunities of attaining a satisfactory result are less. In a corner house, indeed, playful and original treatment may often be possible; and if the streets happen to meet at an acute angle, the form which the architect of taste must adopt will usually have something about it of the apsidal or domical feeling. When the junction is of two right angled streets, the building is *pro tanto* for two of its sides removed into the class of country houses. But most houses stand in a street row. Probably the first idea which rises to the mind of the lover of the picturesque, who has walked up Harley Street or down Gower Street, with his head full of the gables of Amsterdam, or of some old Flemish or German city, is a feeling of resentment that our towns should not be built likewise. But if we apply the test of measurement, we shall find that there would be substantial difficulties in the way. The usual run of English houses are too small for the larger type of German gables, story upon story, and too big for those of Amsterdam or Bruges, whose inhabitants, accustomed to more simple habits of life than Englishmen, contentedly inhabit apartments which we should think intolerably small. The tall narrow Dutch house runs quite naturally up into its gable, which is, moreover, in later specimens, usually recurved at the sides; besides which, the gable room is usually not a sleeping place, but a large store chamber, and often has in the middle a door for the object of craning up goods from the street. I believe it would pretty severely test the ingenuity, as well as the daring, of any Fellow of the Institute to put a gable on any house in Harley Street or Gower Street (adapted, of course, as being an English attic for servants rooms), which would bear the same proportion to the pile below as an Amsterdam gable does to its house. I do not, of course, say that the house-broad gable cannot be introduced into town houses when they are built *de novo;* but it never can be added on to an existing house.*

The sky-line of the house in the row, which is of course only visible on the street-door side, must chiefly depend on its chimneys, and on the bold dormers of the windows standing out of the loftily pitched roof. Sometimes a house is built so much more lofty than the rest that it can display all four sides, but such cases are exceptions. While disbelieving generally in the possibility of gabled houses for (at all events) London, of which city chiefly I am speaking, the case, I fully grant, being different as to the smaller abodes and the more roomy areas of provincial towns, I cannot at all see why two-storied attics, either of the one-sloped or the mansarde type should not be extensively introduced; they always look well and stately, and they may always be made both useful and comfortable, with windows opening to the outside, and rooms of adequate height. In the treatment of the gutters, which he will have to bed in cornice-like projections, the architect has the opportunity of much good design; but as this is not sky-line, I ought not to have mentioned it. The adventitious enrichment of the sky-line, which a ridge crest will contribute, is a point to be noted here, though it need not now be discussed.

This will be the place to say a few words upon a form of steepled roof, which has within these few years left its mark, both upon Mediæval and Renaissance buildings in London, the truncated steep pyramid, or four-sided spire. Among the foreign importations, there is no one more distinctly exotic than this, which never, I believe, crossed the Channel from its native France until it appeared upon the secondary towers of the Palace of Westminster. It has accordingly been, on the one hand, warmly welcomed by all the architects whose first idea was to reform the insipid sky line of our urban buildings, and on the other, cold-shouldered alike by the pure classicists and the votaries of inflexible English Gothic. My own feeling is that it is a valuable addition to our repertory, but that it ought to be employed under conditions. Generally speaking, it is admissible when it surmounts a tower whose parapet is elevated above the average roof line, or when it gradually grows out of the roof itself. I cannot look upon it as well placed when it is planted on the angles of a building at the same elevation as, but quite detached from, the residuary roof. Besides, in every case, I believe that the architect ought to coax its lines, and bring them down to the base, so as to curve, more or less, gently outwards. A rigidly straight contour can hardly fail to be somewhat stiff. Again, this sort of roof ought if possible not to be covered with the ordinary square-cut slates; smaller slates, scallop-cut, or tiles or lead is preferable. Finally, the effect is much heightened if the summit is, as at the Palace of Westminster, enriched by a conspicuous ridge crest, and if the flanks are dappled with small dormer openings.

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* I was much struck, when last in Dublin, with the number of gabled houses, of an evidently Dutch type, which I discovered in that portion of the town which lies between St. Patrick's Cathedral and St. Stephen's Green. I could only account for this phenomenon by supposing that Dublin had taken a start in house building consequent on, and under the influence of, William III.'s accession.

The absolute cupola can seldom be introduced, either into the small country or the street house. But there are other forms, approaching to the domical, which can be used, if not as portions of the main roof, at all events as the capping of appended towers. An appended tower, rising from the ground, may not be often possible in a town house; but in the country it may frequently be an addition, as sightly as economical, to a new house, and it may often go far to cure an ugly old one of its æsthetic and practical shortcomings. A new staircase is wanted, either in addition to the old one, or in order to throw the original staircase into the room. The problem will often be best solved by placing the staircase in a tower. A pantry, a store closet, a dressing room, a tank may be needed, all or any of them may be provided for in the tower. How then is the tower to be roofed? What will be its function in making the sky-line? If it is square it may, of course, be roofed with a simple pyramid, permissibly of a very low pitch, if the style of the house be Italian, else with one of a steep pitch, or with a low octagonal broach; and if polygonal, with a polygonal spire. But this does not exhaust the resources, for the square or the polygonal tower may equally be crowned with one of those cappings of an ogee outline, which Jacobean architects ingeniously developed out of what was undoubtedly one of the cleverest inventions of our later perpendicular architects, the domical capping of the Gothic turret. A similar termination may crown the circular turret, unless in this case the simple circular, rather than the polygonal cone, should be preferred, from the union which it in its sections presents of the curved and the straight line. If the tower be square, the square concave pyramid may likewise be chosen. All who can remember the old British Museum will recollect how effective this form is for street picturesqueness. The four-sided French cupola is also a form of which our architects have hardly yet tried the capabilities. It seems to me, one which is peculiarly suitable to towns, if not repeated *ad nauseam.*

If the cone be preferred as the capping, the best existing English models will have to be sought, not from mansion or castle, but from the kilns called oast-houses, in which the farmer of Kent and of Sussex dries his hops. The oast-house usually consists of one or two round towers, with conical cappings attached to an oblong building. The latter is used for the miscellaneous work; and the towers are the kilns in which the hops are dried, the tops being left open to let off the fumes. I need hardly say that these buildings, with their piquant sky-line, most characteristically enhance the landscape, sometimes nestling in green valleys, and sometimes crowning the continuous upland, especially as they are usually covered with rich coloured tiles.

Supposing, however, that town houses do not admit of towers and turrets growing from the ground, what objection can there be to the corner houses at least being enriched with those angle turrets, polygonal or circular, corbelled out of the walls at midheight, and crowned with steep roofs, which are so thoroughly identified with the early architecture of France and of Scotland? I know not if any Building Act stands in the way of such projections in London; I should trust not. Any how, there can be do difficulty in their being tried out of London. In that most eminently picturesque building, the Masters' Court, built *vis à vis* to Trinity College, Cambridge, by the joint taste and talent of its founder and of Mr. Salvin, such a turret has been introduced with the most perfect success. The usefulness of such a projection, as an additional small room, stands to reason; its picturesqueness is equally beyond dispute. Though it is derived from a Gothic source, it may be equally worked out in Renaissance architecture.

So much upon the subject of roofs; now let us turn to chimneys. Early in this paper I spoke against chimney-pots. I did not, of course, mean to condemn all chimney-pots, but only those abominations in earthenware and in metal which have for so many years monopolised that name. Let but our architects agree to provide the designs for the chimney-pots which they use, and let them make their choice among the patterns, according to the circumstances of each case, and a notable improvement will, by this simple expedient, have been made in the average sky-line. But let us first consider the chimney entirely constructed of stone or brick. Sufficient use has not yet been made in this country of the chimney of which those at the Tuilleries, before referred to, are a striking example. The principle of their construction is the usual one of massing several flues side by side in one tall quadrangular stack, long and thin. The specialty of the form is its height. Such a chimney seen full-face, rising from a mansion, has almost the effect of a tower. If the chimneys are many, the intricate effect of the diverse angles of the various stacks is specially picturesque. While the French Renaissance has the credit of the first idea, it is one which may be adapted to all styles, and the specimens may be variously decorated by surface panelling, or inlaid patterns of differently coloured materials. The only drawback which I know is, that some stays may often be needed to buttress up the mass against the wind. But for what chimneys are, I suppose, peculiarly intended—to carry off the smoke—this form is especially successful. I speak from experience, as I inhabit a house which the late Mr. Carpenter's skill converted into a Louis XIV château, with a mansard roof, planned so as to contain on each of its two floors rooms with sufficient headway, fire-places, and windows that can open, while he raised the lofty chimneys to such a height above the ridge as to make the house, generally speaking, smoke-free (a condition which it had never before fulfilled), and at the same time to produce a very varied sky-line. I venture to make this personal allusion, not only because I feel it just to the memory of one who has been too early called from us, and who did not live to see the completion of his own work, to commemorate a successful achievement of his in a style with which he was not usually identified, but because it was to having to deal with my own house that I chiefly attribute the formation and ripening of my own ideas, on sky-line. Had I been building a house from the ground, I should no doubt have made it Gothic; but I had to deal with a house which was Italian, and which it would have been impossible to Gothicised. So I asked myself the question, what principles of beauty and of convenience are there which give a charm to Gothic and yet can be grafted into Italian without detriment to its unity of style? My answer to myself was, high roofs and tower-like chimneys fulfil these conditions, and so a nineteenth-century Italian house may be turned into a free imitation of a Louis XIV. château, without involving the destruction of any form or feature existing below the cornice.

No doubt the construction of loftier chimney stacks in town houses entails more outlay at first, but that outlay is abundantly re-compensated by the comfort of smoke-freedom which it brings with it. The particular kind of chimney construction of which we have been talking is equally suited for town and country. Whether or not the more habitual forms of Gothic chimney which we so often see, wherein each flue is represented externally by its own circular or angular shaft, can be so easily fitted to the conditions of civic building, is a question which I shall not raise. But I must introduce to you a peculiar form of old English chimney, indigenous in the Weald, and still habitually constructed there with successful ease by country workmen, which, from the simplicity of the materials used and the beauty of the result, would prove a valuable addition to the sky-line repertory, either of town or of country. Several flues are collected into one stack, of which the material is always brick, the section being square or rectangular, sometimes varied by an angular projection at the sides, so as to produce a species of star-shaped plan, and sometimes by a projecting vertical rib. The shaft is generally pretty lofty, and at the summit the chimney spreads out with several tiers of bricks overlapping each other, and of course following the section of the shaft, while sometimes the effect is heightened by a moulding of bricks put anglewise. Nothing, you see, is used but common brick (here and there of course cut), but the gracefulness, yet solidity of outline, and the effects of light and shade which one of these chimneys gives renders the idea well worthy of developement for more imposing structures than those which they at present surmount.

As for chimney-pots, I have little to say more than I have done, viz. that as no doubt they are often needed, they are not beneath the architect's care. If they are put up behind his back, or because he despises such trifles, then his work will no doubt be spoilt (if there is spoiling in it), with or without his own fault. As a general rule, I think I may once for all say that the architect who does not intend to design his chimneys (with or without chimney-pots) high enough both to carry off the smoke, and also to gratify his own eye by the sky-line they make, is so far untrue both to the practical and to the artistic requirements of his profession. If, after all, he makes a mistake, and if chimney-pots are needed to cure the smoke, so much the more pity; but at all events he will have meant well. I can find no such excuse for the architect who does not intend or care to provide a chimney tall enough for a chimney's first duty in the order of created things—carrying off smoke. I again repeat, to avoid mis-conception, that I allow of chimney-pots, provided these pots are designed or selected by the architect, not by the smoke-doctor; and I ask if the mystery of smoke-cure is very much deeper than many other practical questions which have to be fathomed before the aspirant ventures to practice. There is a form of chimney-pot common in Venice and other Italian cities, consisting of a cylinder expanding towards the top, like a funnel. Whether it was the novelty of this form which struck me or not, I rather liked it, and I venture to offer it for consideration, supposing its powers of drawing smoke to be beyond question.

You will see that the sky-line of which I have all along spoken has been a rigidly practical one,—nothing more than the roof and the chimney. It would lead me far beyond the limits of a paper if I were to enlarge on the conditions under which the sky-line might be further varied by a turret or a spirelet rising from the roof. This is often far from a useless appendage, when a ventilator, a clock, or a bell is wanted; and my experiences lead me to think that when there is a real use for a thing, the honest intention to make it graceful as well, is seldom difficult of accomplishment. I must also postpone what I might have to say on the fringing of the sky-line, by crestings of metal or terra-cotta. It is a question which I commend to those who have to work out the question as well worthy of their attention.

There is one general consideration with reference to the necessity of an effective sky-line in country houses which must not be overlooked, that the condition of the forms and the foliage of the trees brought into immediate juxtaposition with our houses is undergoing a notable transformation. Every day the cultivation of the gigantic and rapidly-growing conifers of Western North America, India, and elsewhere, which experience has proved to be hardy in this climate, is becoming more and more common. In large demesnes these are often by preference—in small demesnes they must always by necessity—be planted close to the house. It is not then too much to say, that in every Wellingtonia and in every Douglas fir which we see pushing upwards its peaked aspiring head, and in every Deodar which is gradually maturing its broad and massive outline, close to the homes of English comfort, we see a fresh demand upon our public taste no longer to allow the study of the architectural sky-line to remain in the category of the things which are permissible but not essential.

The PRESIDENT (Professor DONALDSON) said they had been favoured with a very suggestive paper, and he should be happy to hear gentlemen who had any observations to make upon it. He regretted that the commencement of the paper should have been deferred so long as to leave but a very brief space of time for its discussion. They could, however, hardly pass away with the mere impression of what was said. Some present would doubtless wish to give expression to their views upon what Mr. Hope had so kindly suggested to them.

M. DIGBY WYATT, Fellow, said that it was to be regretted that the late hour left them too little time to give adequately to Mr. Hope and Mr. Nelson the vote of thanks which was so justly due to them. The papers read that evening, though apparently disconnected in theme and scope, had yet something in common. The last had presented to them the results of an elaborate investigation into one of the most difficult problems of their art; and one which it had occupied no mean portion of the life-long labours of the subject of the first—the illustrious Von Klenze, to carry out practically and successfully;—with how much skill and mastery, the beautiful "sky-lines" of the Walhalla, the Ruhmes Halle, and the Glyptothek would bear witness for, probably, very many centuries. Mr. Wyatt had felt anxious, when the first paper was concluded, for an opportunity of bearing his humble personal tribute to the extreme elegance of Von Klenze's manners, which united French vivacity and polish with German manliness, warmth and kindness. Nothing could exceed the activity and intelligence of his bearing, and the hearty interest he had manifested in the spread of a knowledge of the best models of art, on the occasion of Mr. Owen Jones and himself first sketching out to him the grand projects of the Crystal Palace at Sydenham. It was entirely through the prompt and spontaneous exercise of his kindness, and by the employment of his personal influence (which seemed to be unbounded) with King Louis, that this country had been favoured with original casts made, for the most part for the first time, from many of the grandest specimens of the celebrated collection of antique sculpture in the Glyptothek at Munich—such, for instance, as the Eginetan pediments, the Ilioneus, the Barberini Faun, and the Rondanini Muse. He procured for Mr. Jones and himself (Mr. Wyatt) the honour of a private audience with King Louis, and backed with his fervid assurances, their protestations, not only that the operation of taking the casts would do the works of art no harm, but that it would redound to his Majesty's credit that the fact of his collection of such splendid relics of antiquity should be made palpably known in this country. In comparing the works of Von Klenze with those of his contemporaries—such as Von Schinkel, Gärtner, Ziebland, &c. Mr. Wyatt strongly felt his superior excellence. The Prussians would no doubt stand up for the more plastic imagination of the first named of those contemporaries; and there could be no doubt that the example set by Schinkel was of the greatest possible value in the formation of Von Klenze's architectural style; but it was nevertheless probable that the tests of time, as applied to the monuments erected from the designs of both, would ultimately vindicate Von Klenze's superiority. His studies were based upon the revival of the antique at Paris under the school of David and Girodet in painting, and Percier and Fontaine in architecture. The latter and others were doubtless great men in their several ways, but it was to be remembered that no one of recent times, at the early period at which Von Klenze first attempted the union of painting and sculpture with architecture, in his designs for the Glyptothek, had contemplated any result so truly and emphatically monumental. That noble union he was, Mr. Wyatt believed, the first man in his generation, on this side of the Alps, to carry to a successful issue. Under his council and guidance, and by his untiring energy the talents of Hess, Cornelius, Schwanthaler, Rauch, Von Schnorr and others had been made tributary to undying effects of monumental art. For an honourable life of labour and the fervid exercise of rare artistic and practical capabilities Von Klenze was entitled to their most supreme respect.

Passing from Mr. Nelson's contribution to the evening's entertainment, the speaker was pleased to recognize that although at the beginning of his paper Mr. Hope had attacked (and with some justice) the "sky line" of Somerset House as presenting a lamentable contrast when put in comparison with the sky line of many other buildings at home and abroad, he had, at the same time (with his usual tact and honourable candour), admitted, that rarely, if ever, had the contours of many of the buildings designed by Wren and Inigo Jones been excelled. When the student looked from the top of the Monument in London over the beautiful campaniles of the City churches, the splendid dome of St. Paul's, and onwards to the accumulated glories of Westminster, and compared his impressions with that which he might have received from a corresponding survey from the Campanile at Venice, Mr. Wyatt thought he would have to admit that England offered the nobler prospect of the two, so far as architectural sky-line was concerned, even taking in the lovely outlines of the Salute and of the Dogana.

Had time permitted he would have been glad to have heard Mr. Beresford Hope's impressions of the value of the singularly varied compositions of probably the greatest architectural genius of the present generation—that most accomplished master of "sky line"—the late Sir Charles Barry. When one saw the graceful towers of Trentham, the well-balanced masses of Cliefden, Bridgewater House, and other buildings of Italian character, as well as the varied silhouettes of the Houses of Parliament, profiled against the sky, it was impossible not to acknowledge Sir Charles Barry's command over the mysteries of that branch of architectural composition which had formed the subject of Mr. Beresford Hope's paper. By the architect of the Palace at Westminster the difficult question of chimneys had never been evaded nor carelessly carried out.

While Sir Charles Barry's *practice* had been so valuable in the matter of "sky line," the *precept* of the late Mr. Cockerell had been no less so. He remembered, when quite a student, the very admirable lecture given by their late regretted President at the Royal Academy on the subject of sky line, (it was, he thought, the second or third after his election as professor of architecture to that institution) illustrated by his own beautiful drawings, and by many from the pencils of Gandy, George Moore, and Dodgson. The masterly style in which he had laid down the principles of judicious contrast as a source of delight was most excellent, and never to be forgotten by those who heard him. The way in which he showed how one form might be brought out to relieve and enhance the beauty of another, the value of the long straight line as giving additional emphasis to the salient spire or dome, was one of the happiest æsthetical demonstrations the speaker had ever listened to.

In conclusion Mr. Wyatt expressed the obligations of the meeting to Mr. Beresford Hope, who he was rejoiced to find clearly recognized, that it was not in any particular form or style that the excellence of effect he contended for was alone to be found, but that it was possible for all, without sacrifice of individual character, to unite in the production of an entirely satisfactory effect. He now begged to propose votes of thanks to Mr. Beresford Hope and to Mr. C. C. Nelson for their labours for the entertainment and instruction of the meeting.

The PRESIDENT said they must all own that their friend Mr. Hope possessed an hereditary sympathy for art in general, and for their own in particular: and the son of a man whose name was dear to every architect had felicitously suggested a topic rich in material, to which he had added judicious observations, both suggestive and instructive to architects. The son of the historian of architecture has shown originality in his treatment of the subject, and has handled it with a judicious reserve, which they must all admire. As to Somerset House it was true the great defect of that building was in the upper portions of the river front, while the lower parts were noble in design. At the same time if they took another portion of the same building, the Strand front, they found much to admire in the sky line, and the courts were very grand. He might compare the river front of Somerset

House with a work of the Louis Quatorze period, viz. the garden façade of Versailles. Perhaps there was hardly anything to be found more tame. It wanted the high-pitched roof, which Mr. Hope had suggested, and the chimneys carried up, forming that outline he so much admired, as was done not only by architects of the Louis Quatorze period, but even in the works of preceding sovereigns, as at Blois. There was boldness of design, which was not equalled in the Louis Quatorze period. Mr. Hope had alluded to the Oast-house of Kent, which reminded one of the pigeon-cotes in the villages of Egypt, and which greatly varied the square outlines of the structures in that flat country. Chimneys, dormers, balustrades, and other terminal objects to vary the sky line had been illustrated in the publications of the Architectural Publication Society. The managers of those publications had given a series of sheets of the most valuable kind, showing the manner in which peculiar forms might be given to even the commonest subjects. Mr. Hope had been kind enough to call their attention to this matter. He only wished in addition that he possessed the same graphic powers as his late father, and that the paper had been accompanied by the same richness of pictorial illustration which distinguished Thomas Hope's famous work on architecture. He was quite sure the vote of thanks, which had been proposed, would be accorded to Mr. Hope with the greatest cordiality and unanimity.

A vote of thanks was also passed to Mr. C. C. Nelson for his memoir of the late Leo Von Klenze.

A SHORT DESCRIPTION OF THE SERIES OF WORKING DRAWINGS OF THE NEW OPERA HOUSE NOW BUILDING AT PARIS, PRESENTED TO THE INSTITUTE BY THE ARCHITECT, M. CHARLES GARNIER.

By The President, Thomas L. Donaldson.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, April 4th, 1864.

The President said, during his visit to Paris, in December last, he was able to obtain a considerable amount of professional information, and amongst the rest, some which he thought was of interest to this Institute. Amongst other large public works in course of prosecution in Paris was the New Opera House, designed and now being carried out by the architect, Mons. Charles Garnier. Being desirous to obtain some particulars respecting it, as well as to gratify himself by an inspection of the operations as far as they had proceeded, he went to the office of the architect on the works, and that gentleman very courteously accompanied him over the whole of the building. He afterwards showed him a vast number of drawings of all the details of the work, so far as it was then executed. Having remarked that they had no such class of elaborate drawings prepared for works in London, and that therefore he should be glad to be favoured with a few of them, to show his professional brethren the minute study and remarkable care, which had been bestowed upon all the details of that great work, M. Garnier promised to present some copies, which were now on the walls, to the number of 167. As was usual, the drawings had been prepared with a kind of autographic ink, capable of being transferred to stone or zinc, from which as many impressions could be taken as the architect required. Every architect of a large building in Paris had his *atelier* on the works, with a number of draughtsmen employed in preparing the drawings; and the dimensions of every stone are given, that its due value might be estimated when worked up in the building. At the time of his visit to Paris the building had only reached the first floor; and if the drawings for the entire structure were carried out in the same elaborate manner they would probably number over 500 or even 1000. However, he was very glad to get this instalment, for he felt it was to the interest of the Institute to have them, and he trusted they would be put together in a volume for future reference.

Having made a somewhat minute personal inspection of the works, he would, by the aid of the drawings, describe what he knew with respect to this New Opera House. They were aware that Napoleon III., like Augustus of Rome, was really rebuilding Paris; and though marble was not the material employed, still the works were carried out in good sound stone, and were constructed altogether in a style surpassing anything previously executed in that capital. The class of stone employed was superior, being got higher up the Seine, and from other quarries; and the works were in every way sounder both as to material and execution. They were aware, with respect to the '*coupe des pierres*,' that no school in the world was so celebrated as the French. There was the most elaborate design of all the parts and joints, and it was necessary to have men of very superior ability to carry out that class of construction. Many present would doubtless recollect in the constructions at Versailles of the period of Louis Quatorze, there were staircase landings of very elaborate structural combination. In England, large landings were simply slabs of Portland or Yorkshire stone, without any peculiarly geometrical combination of parts, and merely pinned into the walls to hold them up; but at Versailles there were landings six or eight feet wide, composed of comparatively small stones, with a complication of arches, so put together, that, though greatly projecting from the wall, they were perfectly solid and substantial.

As he had said, Napoleon was re-building Paris. In addition to piercing the city with large open streets and thoroughfares, he had built an immense number of theatres. In the Place du Chatelêt, on the bank of the Seine, and on the line of the Boulevart Sebastopol, the municipality had erected two large theatres—one on each side—and many others in other parts of Paris. Among these operations had been commenced this grand New Opera House, opposite the end of the Rue de la Paix, and on one side of the new Boulevart Malesherbe. The building itself occupies nearly 2¾ acres of superficial area. We must estimate such monuments by acres, and the streets by miles. And it was in this grand style that the present Emperor took up these operations, which for magnificence and extent were worthy of the time of Augustus. It was not to be imagined, however, that this building was very much larger than some of the greatest ancient theatres. He recollected measuring a theatre at Dramyssus, in the Epirus, the diameter of which was 400 feet; but this building was 490 feet long, and the extreme breadth 328 feet.

The President then proceeded to describe many of the drawings, particularly the plan. In the first place, was the front arcade, 189 feet wide, and with an avenue behind it 12 feet broad. This led to another vestibule, 224 feet long and 30 feet wide, which again conducted to an inner vestibule 18 feet wide. The crowd would come in at different entrances, so as to prevent an insufferable degree of pressure at any time; and they were gradually brought from the points of entrance to the interior. The area of the principal staircase was 52 feet square. The steps rose from the centre and turned off right and left, being 15 feet wide. There were also three secondary staircases, with flights of steps each 8 feet wide, so that abundant room was provided for entrance and exit. All this was devoted to the entrance into the theatre, which constituted the great difference between the theatres on the Continent and those of London. They afforded greater capacity of circulation, whilst in this country the greater portion of the area was necessarily devoted to the audience part, so restricted were the plots appropriated to our theatres. A side entrance and private staircase was appropriated to the Emperor and his suite. Here was a circular hall, 45 feet diameter, leading to the private staircase, which led up to the Imperial box, in connexion with which was a magnificent circular saloon, 45 feet in diameter, sufficient to receive a cabinet council, should affairs of state require such a contingency. The lower corridor, 17 feet in width, opened into a lower range of boxes. He gave these dimensions for the sake of comparison with the narrow corridors of accommodation generally prevailing in the theatres of this country. Here they had another staircase and smaller staircases right and left. With regard to the theatre itself, the width between the fronts of the boxes is 68 feet, and the width between the walls behind the boxes is 100 feet 6 inches; the depth of the house is 100 feet. The width of opening of scene is 52 feet; the depth of stage, 98 feet; admitting of an extension of 57 feet, making a total depth of stage of 155 feet (unequalled in any other theatre) for effect in grand spectacles. The extreme width of the stage is 175 feet. The French arrangements for the machinery at the sides were of great perfection, and had lately been, to some extent, imitated in this country; and the whole body of science and skill had been brought to bear to make the entire combinations of this remarkable building as perfect as possible.

He should state, with regard to the new theatres in general, great study had been given to the lighting and ventilation. In the theatre of the Place du Chatelet, the lights were placed above the ceiling of ground glass; but, as far as his experience went, he considered such a light rather obscure; and he thought the introduction of the intermediate screen was not altogether successful. At present, the system of ventilation was very much one of experiment; they could hardly say whether, in each particular instance, it would be successful or not; and it required a good deal of practical knowledge and science, and he would add, patience, to succeed in carrying out a well ventilated building. Whether in a single room, or in an entire building, or on so large a scale as in this theatre, the subject of ventilation was still one of the most difficult of problems.

The President then directed attention on the drawings to that part of the building, which was appropriated to the administration of the establishment, and the rooms for the various classes of artistes, the number of which were immense, and admitted of that disposition of the several classes of artistes and theatrical property, which was so necessary to realise, and which would enable the most judicious arrangements in that respect to be carried out by a complete and systematic classification. As this building was only now as high as the first floor, he could not lay before the members the complete drawings and plans of all the parts, but from the 176 drawings which had been presented they could judge of the magnificence of the design and execution of this work, and the elaborate study that had been bestowed upon it. There was a profusion of taste and imaginative faculty, which some might consider had perhaps been carried to luxuriant excess. The estimated cost of the building was from £700,000 to £800,000, but there was no doubt it would cost at least £1,000,000; and with the many appliances and means of execution at command, it would be an European monument of the greatest magnificence.

He had given them this general information, not having had time to study or even to obtain more minute details from the architect. Assuming these plans to be correct (and the French were remarkably correct in their drawings as well as in reduced drawings) he now wished to draw attention to a comparison of the sizes of the principal European theatres. Here was a table shewing the area of the New Opera of Paris to be 2·65 acres; that of the Old Opera, 1·50; Madrid, 1·00; Covent Garden, 0·70; St. Petersburg, 0·75; Bordeaux, 0·75; Carlo Félice (Genoa), 1·00; Parma, 1·00; La Scala (Milan), 0·90; S. Carlo (Naples), 0·90. The width of scene was, in the New Opera of Paris, 52 feet; Old Opera, 40 feet; Madrid, 55 feet; Covent Garden, 40 feet; St. Petersburg, 45 feet; Bordeaux, 38 feet; Carlo Félice (Genoa), 40 feet; Parma, 40 feet; La Scala (Milan), 45 feet; S. Carlos (Naples),* 45 feet. Another great feature of this New Opera consisted in the great depth of stage provided for, which was necessary for the due display of scenic effects in the present taste for melodramatic representations. The Italians were the first to make these great depths of stages, owing to the dramatic character of their ballets, while the French ballets consisted principally of dancing only, rendering a greater depth of stage necessary in the former case, by which the aerial effects of distance in pictures were capable of being produced upon the stage.

In conclusion, the President said he had given these general dimensions; he could not vouch for their precise accuracy within a few feet, but they would serve to give a general idea of the leading principles, which directed the construction of such buildings, and they saw how far those principles were realised by different nations; and they must look to the genius and tendency of the people by considering the size of their theatres, and the manner in which they carry out their dramatic representations. He hoped these few particulars would not be without interest, and they could not but feel very grateful to Mons. Charles Garnier, the generous architect, who had given them these studies of his art—evidence of great merit.

Upon the motion of Mr. **Kerr**, the thanks of the meeting were accorded to the President for his communication, and a special vote of thanks to Mons. Garnier for his valuable contribution to the collection of the Institute.

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* Mr. Fergusson, in his able work on the "History of Modern Architecture," gives an useful table of comparative dimensions of European theatres, which, however does not include the Italian ones.

SOME ACCOUNT OF RECENT DISCOVERIES OF PLACES AND BUILDINGS OF THE FOURTH TO THE SEVENTH CENTURIES IN THE HAURAN, NEAR DAMASCUS, AND IN THE COUNTRY ABOUT ALEPPO AND ANTIOCHEIA.

By The President, Thomas L. Donaldson.

Delivered at the Ordinary General Meeting of the Royal Institute of British Architects, April 4th, 1864.

The President said that he had recently had the opportunity of making, through Mons. Longperrier, Conservator of Antiquities at the Louvre, the acquaintance of the Comte de Vogüé, author of the work on the Churches of the Holy Land, and who had lately returned from a visit to Syria, exploring more especially the Basaltic Deserts of the Hauran to the south of Damascus, and the less arid districts to the north, about Aleppo and Antiocheia. M. de Vogüé had showed him the engravings of buildings for a fresh work he was about to publish, opening out a new subject for consideration of a period, of which we have no idea in this country, and which had never been illustrated, though mentioned by travellers. He thought this might be interesting to the members of the Institute, and he ventured, in a conversational manner, to communicate to them the few facts, of which he had become possessed.

Having pointed out upon a map the geographical position of the region under consideration, the President went on to remark, that the Holy Land had already been searched thoroughly. It had recently become celebrated from the visit of the Prince of Wales. A great many of the principal buildings were pretty well known; but the district of country—the Auranitis and Trachonitis of the ancients—had never been properly explored. Mr. Cyril C. Graham read a paper before the Royal Geographical Society on 22nd February, 1858, in which he gave a highly graphic account of his travels in the desert east of the Hauran, and in the ancient Land of Bashan. Mr. Graham alluded to previous travellers, who had gone through that country; it was, therefore, necessary to consider the discovery of these ancient cities in chronological order. M. Seetzen, attached to the Russian embassy, visited the Hauran in 1805. Burchardt was struck by the account contained in Seetzen's description to Baron Zack, and determined in 1810 to explore the country. His travels in Syria contains a very detailed account of the numerous ancient towns in the wilderness of rocks in the great desert on the eastern limits of the Land of Bashan. He was succeeded by the superficial Buckingham. But we are indebted to Mr. Porter, our consul at Damascus, for the more perfect description of these parts in 1853. Mr. Cyril C. Graham rapidly explored this country in 1857, and communicated the results of his journeyings in the paper read before the Geographical Society on the 22nd February, 1858. One of his opening passages is very graphic.

"I think if you were to tell the most phlegmatic person, that from an ancient castle perched on a hill, and which had been the turning point of all travellers, a wide plain extended, which as far as the eye could reach was dotted over with towns, which were known to have been uninhabited for centuries, but which no person on record had entered, his enthusiasm would be kindled, and he would be desirous of sallying out on a journey of discovery into this plain. But when that castle perched on a hill is Salcah, and that hill 'the Hill of Bashan,' and those cities in the plain 'the cities of the Land of Moab far and near,' the very cities of which the Prophet spoke when he said, 'The cities thereof shall be desolate, without any to dwell therein'—then an irresistible desire comes upon one to go out among these cities, and see the habitations of a once powerful people, who have so completely passed away, that as far as we know no descendants of them are now to be found."

It would appear that these towns, constructed of stone, and many of the erections being built of huge squared blocks of hard basalt, retained their buildings in a wonderful state of preservation; in fact, so much so, that the Druses, driven to these wild parts for shelter from their oppressors, had very little to do to render them quite habitable, for frequently even the very doors, formed of a stone slab six feet high and twelve thick, with hinges as tenons wrought out of the solid, remained *in situ.* A specimen of these doors exists in the British Museum. Flights of stone stairs are found outside and inside the buildings.

The President then proceeded to illustrate the method in which the stone roofs of the buildings in this district were constructed. In the entire absence of trees in this basaltic region, the roofs were built with frequent arches, springing from piers at a very little distance apart, and covered with slabs of stone after the manner of the Egyptians.

Mr. Graham alludes particularly to the enormous city of "Um el Jemal," to the south of Bosrah, and probably the "*Beth Gamul*" of scripture, and which stands alone in the desert.

"This is, perhaps, among the most perfect of the old cities which I saw. It is surrounded by a high wall, forming a rectangle, which seems to enclose as much space as the walls of the modern Jerusalem. The streets are many of them paved, and I saw here what I do not think I saw anywhere else, open spaces within the city such as we should call squares. There were some very large public buildings; but although I diligently sought for inscriptions, I only found three: one of them in red Greek letters on a large tower, which I fancy was a prison, or perhaps in later times a convent, as there were many red crosses upon it. The houses were some of them very large, consisting usually of three rooms on the ground floor, and two on the first story, the stairs being formed of large stones built into the house walls, and leading up outside. The doors were as usual of stone: sometimes there were folding doors, and some of them were highly ornamented.

"On reaching this city (as indeed it was my practice in all such places) I left my Arabs at one particular spot in charge of the dromedaries, and posted sentinels on the towers to watch the approach of any foe; then, taking my rifle with me, I wandered quite alone in the old streets of the town, entered one by one the old houses, went up stairs, looked into the rooms, and in short, made a careful survey of the whole place; but so perfect was every street, every house, every room, that I could almost have fancied, as I was wandering alone in this city of the dead—seeing all perfect, and yet not hearing a sound that I had come upon one of those enchanted places that one reads of in the 'Arabian Nights,' where the population of a whole city had been petrified for a century.

"In Um el Jemal there is a fine arch, like the triumphal arches in Roman cities, and under it lies a mutilated inscription in Latin, almost the only one in that language I saw in the Haurán. No doubt this city, from its size and the richness of the soil about it, must have been a most important place under the Roman rule, as in times long before. There are numerous reservoirs here, but, like those in all the other towns about there, they are quite dry. The tombs are outside the walls of the city, so that here, as at Palmyra, they practised extramural burial."

Mr. Murray enumerates the several towns he explored, and concludes with a brief allusion to Um-er-Rumán.

"This was a very curious old town. I had heard a good deal about it from the Arabs, but in this case I found the account they had given about its beauty correct. The houses were in a very ruinous state, but the tombs were more than usually handsome, and decorated with carvings of fruit. Yet they were certainly not Rumán, but resembled some of the more beautiful tombs outside Palmyra. Leaving

Um-er-Rumán we came successively to a number of these old towns. I do not give an account of each of them here because it would be tedious. I have all their names written down, and have copied all inscriptions in them I could find. Amongst the most interesting were Mashkúk and 'Anz."

It appears that thousands of the basaltic blocks strewed on the surface of the soil in these deserts contain inscriptions, and rudely carved figures of animals and other objects, some tolerably well executed, others very rudely incised. M. de Vogüé visited the same tract of country in 1862, in company with Mr. Waddington. In his communication to the "Academie des Inscriptions et Belles Lettres" of the Institut of France, in 1863, he notices the remarkable phenomena of these parts, almost abandoned at the epoch of the Mussulman invasion, and then occupied by the Druses since the commencement of the last century. It preserves, as it were, the physiognomy of the seventh century of our era, for the buildings then ruined by war had not been rebuilt, and those overthrown by earthquakes still lie on the ground, and the Druses, who never build, have established themselves in the ancient houses still standing, or, as wild beasts, find shelter among the piled blocks of the ruins. In the Haurán monuments of various periods still exist. Side by side with those of the Christian epoch, houses and churches are to be found, temples, baths, triumphal arches, residences of the time of the Roman rule, and even some edifices anterior to the Roman conquest. These latter are very rare, and are of the century preceding our Saviour, and of the reigns of the two Agrippas. Thus these present a series of edifices in the Trachonitis and Auranitis, in an uninterrupted chain of eight centuries, and furnish most interesting and valuable materials for the history of architecture.

We find first, that is to say, under the Seleucidæ and the Kings Agrippa, Greek art predominant; but with a certain freedom, yielding to Oriental fancy, and admitting a modification and mixture of the orders and a certain caprice of ornamentation. Then comes Roman art, with its powerful administration and trabeated architecture, which is adopted at Kennaonat and at Bostra, as at Heliopolis and Palmyra. But soon the straight line of the architrave became curved, arches spring from capitals of columns, buttresses line the walls to resist the thrust of the vaultings; the cupola upon the square base appears, at first timid and awkward as at Shakka or at Omm-ez-Zeitoun; then more bold and better put together: and from transformation to transformation we arrive at the polygonal churches of Bostra and Ezra, the predecessors of Santa Sofia at Constantinople. In the north of Syria, however, this revolution is longer in being effected. The large churches of El-Barah, of Bakousah, the magnificent monument of Déir-Semaân are classical in their general composition, but in the details a new sentiment of art is perceptible; in the arrangement of arches and their supports; in the execution of the ornamentation, flat and cut up; geometrical figures mixed up with a vegetation of conventional leaves; the germ of the principles, which later produced the art of the Byzantines and Arabs, and which still later influenced and predominated in the various developments of the Roman style in Italy, Germany, France, and England.

In the mountainous regions between Antioch, Aleppo, and Apamea, on the right bank of the ancient Orontes river, there exist the remains of buildings and entire towns, almost untouched; or, at least, all the parts of which exist, sometimes thrown down from various catastrophes but never dispersed. These reveal to the traveller's view all the secrets, as it were, of a civilization long since passed. He passes along deserted streets; enters abandoned courts, and sees porticoes, where the vine twines its tendrils round the shafts of the columns still standing though mutilated.

He experiences the same emotions as when visiting Pompeii; less complete, perhaps, for the climate has not so well protected the ruins of Syria as the ashes and lava of Vesuvius have preserved those of Pompeii and Herculaneum. But a newer field of contemplation presents itself, for it is less known than the civilization of the Augustan period. In fact, all these cities, to the number of more than 150 upon a square area of 30 or 40 leagues, present a chain of monuments, regular and consecutive, belonging to the same system, the same epoch, namely that of Primitive Christianity from the fourth to the seventh century of our era—the least known of our art. Here one is transported into the midst of early Christian society and habits of life; not the hidden, degraded, timid, suffering existence of the catacombs, as we generally regard this early period of the faith, but an opulent, generous, artistic life; large houses built of squared masses of stone, with all the comforts and elegancies of covered galleries and balconies, fine gardens planted with the vine, presses to squeeze the grape, and tanks to receive and store the juice; large subterraneous cellars, stables for horses with their stone fittings; noble courts and open places surrounded by porticoes; elegant baths; magnificent churches with columns, flanked by towers, surrounded by splendid tombs.

Crosses and monograms of Christ are carved in relief upon the greater part of the doors, and numerous inscriptions are read upon the monuments, not containing the names of persons but pious sentences, passages from scripture and dates; the tones of these inscriptions indicating an epoch near the triumph of the church. By one of those phenomena of which the East offers frequent examples, all these Christian towns have been abandoned and devastated at once, probably at the barbarous invasion of the Mussulman and have not been since touched! Were it not for subsequent earthquakes, which have thrown down some of the walls and columns, nothing would be wanting but the carpentry of the construction.

Such are the remarkable pictures, which these regions of Syria present. They possess not the pure monumental edifices of Classic Greece, Asia Minor or Rome, but they furnish us with archæological elements for the classification of ancient buildings of a peculiar period of art, based upon facts and dates that are incontestible. In the three centuries, that at Rome bad churches were built from the ruins of anterior edifices, ill put together and without any order, in the Haurán and about Antioch the construction consisted of blocks of stone, varying from 4 feet to 12 feet long,—doors were cut out of the solid stone,—windows in blocks of basalt,—houses were surrounded by two tiers of colonnades, the columns consisting of monoliths, 12 to 18 feet high, and the capitals carved in an altered style it is true, but still vigorous and original.

Explorations in these countries has hitherto been accomplished under great difficulties and considerable danger, owing to the rapacity and hostile attitude of the tribes, who occupied them; but these are now yielding to the advance of Western civilization, and it is to be hoped that ere long it may be as easy to visit those parts as the more accessible regions of Greece and Turkey. Already a missionary stated, in a recent number of the ‘Missionary Intelligencer,’ that after a tour in the Haurán he had returned to Damascus, when he was transported to Beyrout on the coast in only ten hours, in a *French omnibus!*—hitherto a fatiguing journey that occupied three days on horseback.

The President then pointed out the illustrations as they were arranged on the walls, enlarged from the engravings, with which he had been favoured by Monsieur de Vogüé, and giving a succinct explanation of each.

Mr. **Fergusson**, Fellow, begged leave to propose a vote of thanks to the President for his very valuable communications. He might be allowed to add a word with regard to the *personnel* of these discoveries. About two years ago M. Rey, a French gentleman, had commenced the publication of a folio work upon the buildings discovered in the Hourán, and as far south as Gerash; another work on the same subject had been published in 1860 by Mr. Wetzstein, the Prussian consul at Damascus. Those explorations were between the dates of those of Porter and that of De Vogüé. Mr. Waddington, who had been referred to as having accompanied De Vogüé in these explorations, was the son of an

English gentleman settled at Rouen, who married a French lady, and whose children were brought up as French subjects. Mr. Waddington was a young man brought up in France, and had travelled a good deal with De Vogüé. In the exploration alluded to, Mr. Waddington devoted himself principally to the inscriptions, and De Vogüé to the drawings; and he believed they brought home with them as many as 600 inscriptions from those parts, the dates of which ranged from the time of Pompey to the time of the Mahomedan conquest. In fact, that country was the great highway between the East and the West, from the time when the Romans got possession of it till the Mahomedan conquest cut across that line of commerce. It was from one century before Christ to the seventh century that all these cities were built, and they bore inscriptions ranging through that period. He believed the whole of the buildings found there belonged to that date—the earliest were Greek and Roman, and subsequently the Byzantine. It could not be questioned that the researches of De Vogüé would form a valuable addition to our knowledge on this subject. He might add that that gentleman was bringing out a large work upon Jerusalem, the result of three years' explorations in that city; and the first number of that work might be expected in the course of a few weeks.

With respect to the first communication with which the President had favoured them, he thought Covent Garden Theatre had suffered in the comparative dimensions given in regard to the width of curtain. The width of scene in Covent Garden, he believed, was 47 feet, instead of 40; that of La Scala 49 feet, instead of 45; and that of St. Petersburg 52, instead of 45.

The figures were given in his own work, from a table given in M. Clement Coutant's "Parallèle des Theâtres Modernes." With regard to the auditorium in the New Opera of Paris, it was small compared with other theatres, being calculated to contain only 2,000 persons, while that of Covent Garden was 2,500 and Drury Lane 3,000. He would not, however, extend these remarks further, as the object for which he rose was to propose a vote of thanks to the President for his interesting communications.

The area of La Scala was about 40,000 square feet, while that of the New Opera was 100,000 square feet. Of the other first-class lyric theatres 40,000 was about the largest, and they decreased from that down to 20,000 square feet.

Mr. JOHN W. PAPWORTH, Fellow, said, if the observations he was about to make did not seem to entirely agree with those of the President, they must not invalidate the good will, with which he seconded the vote of thanks. With respect to the plan of the New Opera at Paris, which the President's observations might be construed to present as a model for a theatre, Mr. Papworth would not deny to that plan the merit of providing for an opera house a vast crush room, screened from the external air by the vestibules; in fact, securing to a quiet crowd a comfortable promenade during the intervals between the acts, and an easy exit to its carriages. But in comparing that plan with the requirements of an English theatre, where the great difficulty was to accommodate the entrance of a crowd, he would notice that the plan before the Meeting seemed a waste of building, because so large an amount of reception room resulted in the creation of a crowd three or four times over inside the walls instead of one outside. The moment the crowd passed the first barrier or check, it would meet with a second. Then followed a passage of 30 feet wide, which was space enough to accumulate a fresh crowd, and the whole of these checks and passages resulted in the audience being let through five doors into the staircases and passages of the auditorium. It is true, as the President observed, that there are entrances at the sides in the New Opera. Another remark was to be made with respect to the great width given to the stairs. If the stairs were only 5 feet wide, the crowd would get in and out better. It was quite true there were side doors in the New Opera, but he felt that the best mode of admitting and letting out a crowd depended on the primary arrangements: if the crowd were to stand in the open air, it would best be subdivided by letting it pass through a range of deeply embrasured narrow, doors at no great distance apart, into a *queue* working round the passages admitting to the staircases, and instead of one vast staircase, half a dozen small staircases would be preferable. If the crowd were to stand under cover, it would be best to divide the portico in a similar manner, forming a *queue* working through doors at a great distance apart into the passages admitting to the staircases. As to comparisons of the width of stage, he had previously expressed an opinion that it would be much reduced when the time should come that the action of the performers was again considered of importance. It was very well where singers occupied the centre of a stage advanced into the auditorium to have a wide proscenium; but when it became so large as in this instance, the scenery of interiors could rarely be at all suitable to the scale of the human figure. Of course, where a building was intended for operas, *i. e.* almost solely for ballets, he could comprehend the necessity for a wide stage, and for great depth in behalf of the landscape scenery, which, in our present theatres, was lost to a large portion of the spectators. The great merit of the New Opera was the accommodation afforded between the side walls for the flies and the dressing rooms; this was not the case in English theatres, which, for the most part, had insufficient space for the machinery upon and beneath the stage. With respect to the 15 feet depth of passage behind the boxes in the New Opera, when they considered that the French boxes had a front and back box each, it might be deemed too large; but really it was not too large for people dressed in the present fashion. With regard to the works in the Hauràn, it appeared that there must have been a main road leading from Busrah through Palmyra to the Euphrates, part of which was the route taken in 1782 by Sir William Donkin, whose description of buildings 1200 feet and 1000 feet square, in the desert, half-way between Palmyra and the river, was published in the fourth volume of the 'Asiatic Researches.' He called the place Castrohuoin; perhaps this was the Kasr Aukheim of the maps. It would appear from that fact, and from the names of places preserved by our geographers, that the country between the Euphrates and Emesa, taken as a point between the Chalcidice and the Auranitis, was occupied by buildings which now required discovery.

The PRESIDENT should have said that the great commercial city of Palmyra was the city of deposit, and was on the main line of traffic from the East to the West. The commerce which came overland from Aleppo came to that western coast of Syria, and was transported thence in the vessels of these cities on the coast into Europe, which produced the large wealth that distinguished those cities.

Mr. PAPWORTH would remark, with regard to the cities of the northern portion mentioned by the President, that the province called Chalcidice by the Romans was more worthy of the attention of the Institute than its members generally might imagine. If Mr. G. R. Lewis's invention, about twenty years ago, of the term Christian architecture was desirable, and every member knew how much discussion that term had caused in its application, from its vagueness, the Auranitis was not such safe ground as the Chalcidice to mention as a country wherein would be found a peculiar phase of art which was literally and emphatically Christian architecture, if that term expressed the architecture invented and practised for more than three centuries by a people so truly Christian, and so free from all pagan impressions that they refused even to commemorate their names in the inscriptions upon their funeral monuments. In the Chalcidice the student would find something looking very like the germ of Byzantine, Arabian and Romanesque architecture, decorated by flat and pierced ornament of geometric figures, mingled with pointed leaves of conventional foliage, of apparently Eastern origin, applied to large stone-built houses, with galleries and covered balconies, in piazzas, containing churches with towers; and all this probably dated no earlier than the time of Constantine, and was supposed to have been abandoned during the first successes of the Mahometans.

The vote of thanks was passed, and another to Monsieur E. De Vogüé, for the illustrations furnished by him, after which the Meeting adjourned.

SOME REMARKS UPON THE WORKS OF THE EARLY MEDIÆVAL ARCHITECTS, GUNDULPH, FLAMBARD, WILLIAM OF SENS, AND OTHERS.

By Benjamin Ferrey, F.S.A., Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, April 18th, 1864.

The enquiry I am about to suggest in the few observations I shall address to you, is one I believe that has never formed a field of investigation either with architects or antiquaries, but is a subject which I think may fairly occupy our attention; and in the course of the examination some facts may be elicited tending to show the practice of those who exercised our art during the rise of the Mediæval styles, which reached their culminating point in the sixteenth century.

The many dissertations which have been written upon the origin and progress of the Mediæval styles all dwell upon the successive changes in expression and advancement of mechanical skill in construction, without enquiry into the names of the distinguished men by whose genius Mediæval architecture gradually acquired an excellence equal, if not surpassing that of the great Classic school; whereas the history of classic architecture, on the contrary, supplies not only the several steps by which it obtained excellence, but also the names of the chief architects who became the founders of distinct rules for the use of the orders according to their several modifications upon the antique models. Mediæval architecture is entirely wanting in records of this kind, and has but slender traditional information by which to ascertain the authorship of any one of the four distinct styles which prevailed throughout Europe from the eleventh to the fifteenth century,—not only are the inventors of the styles (if they may be so called) unknown, but the names of the builders of many of our most interesting churches cannot be discovered owing to an entire absence both of historical and traditional information on this head. If we except the founders of some of our cathedrals, whose names are fortunately mentioned, it may be said that the great multitude of our churches are built by men utterly unknown.

Of the exceptions to this rule I will notice a few examples, where either by incised inscription on stone, or brass, or inserted flint work, mention is made denoting in whose honour the fabric is raised, and couched in some devotional phrases ascribing praise to God. Thus in the case of Valley Crucis Abbey, near Llangollen, across the gable of the west front is inserted this fact:—"Adamus Abbas fecit hoc opus in pace quiescat. Amen." In the tower of the Church of Wanborough, near Swindon, is a brass plate thus inscribed:—"Orate p. Thoma Polton e Editha ux. e ei defunctis. Mag. 20 Philipo Arch. no. Gloucestc. Agne et XIIII alius cor alius. Dns Everard Vicaria e obs suis pocheais. g. h. Campamile ixcrpit Ann° Dom. 1435. Rendered—"Pray for Thomas Polton and Editha, his wife, defunct; for Master Philip Archdeacon of Gloucester, Agnes, and fourteen others his children. For Sir Robert Everard, Vicar, and all his parishioners who this tower commenced, Anno Dom. 1435." Again at Lavenham Church, Suffolk, the founders of a side chapel are thus commemorated:—"Orate pro anima Thomæ Spring et Alicia uxoris ejus qui istam capellam fieri fecerunt A.D. M.CCCCC. vicessimo quinto;" and a few other like inscriptions are met with, some indeed very quaint, and made the vehicle for punning upon the name, as at Christchurch, the Chauntry Chapel of Robert Harys, erected probably in his lifetime: here his name is sculptured upon a shield within one of the quatrefoils of the basement panelling, viz., an initial R. with a hare below it in a cumbent posture, from whose mouth issues a label marked with the letters ys. The same rebus may be traced in other shields, and on a carved scroll, entwining a gnarled stick or rod in the stringcourse, is the following inscription:—"The Lord King of Bliss, Have mercy on him that let make this, the which was Robert Hary's, M.CCCCC.XXV." At Melford Church, Suffolk, the pious benefactors concerned in the building may be known by the inscription under the battlements and windows, as follows:—"Pray for the soul of Robert Sparrowe and Marion his wife, and for Thomas Cooper and Margaret his wife, and Roger Smith, who with the help of the well disposed men of this town did these six arches rear, Anno Dom. M.CCCC.XI." Records of this kind are however very rare, and as regards the greater number of our noble Mediæval structures we are left in total ignorance of the persons by whose genius they were erected.

How strikingly does this reticence on the part of the great artists of olden times contrast with the desire for notoriety amongst men of the later ages. How frequently does it happen in examining post-Reformation works that one finds both the heraldic achievements of the founders and the quality of the architect too carefully preserved, while the yet remaining traces of the ancient building, sufficient to attest its superior workmanship, are the only evidences of an earlier building of great beauty, concerning which we literally know nothing. Those architects whose professional duties have called them to the careful examination of ancient work, can bear witness to the intense pleasure they have felt while sketching and studying the ingenious devices by which difficulties have been overcome and beauties produced out of accidental circumstances, evidencing a degree of genius worthy of all praise; how they long to render homage to the honoured name of the author of such constructive skill, and could almost idolize the artist if only known; and yet no clue of any kind has been found by which to ascertain the name, and transmit it for admiration to future generations.

Now I think, although it may be impossible to find out and identify every great ecclesiastical work with some well known Mediæval architect, yet a skilful process of examination may be set on foot through which we may with much probability discover who were the builders of many of our churches, and show by the unerring mark of the artist's own hand how possible it is to detect his work. Once having ascertained the manner and leading principles which guided some of our great ecclesiastical architects, a close comparison of the details of the several buildings in each diocese may result in showing such remarkable similarity as may only be accounted for by assigning the authorship to one man.

Those accustomed to the examination of country churches in the neighbourhood of the great cathedral cities must have been struck with certain resemblances and repetitions of portions taken from the cathedral church, but executed in an inferior manner, showing a want of delicacy both in the mouldings and carvings. There can be little doubt that the art workmen engaged on the cathedral were also employed in building the parochial churches affiliated to the mother church, and naturally copied or took the details of the greater work for their type; this can easily be detected by the want of that life and spirit stamped upon the details of the lesser building, sufficient to show that the performance was not the production of the master mind, but of a subordinate hand. Instances of this sort may be found in some parts of the Church of Wookey, near Wells, and in the tower windows and other portions of the Church of Stoke sub-Hamdon, in the diocese of Bath and Wells. Again, in the diocese of Salisbury the Church of All Cannings shows some remarkable resemblances to parts of the cathedral, and other examples could easily be cited. These inferior imitations may easily be distinguished from the rich and beautiful details of the larger buildings, and it is in these higher class of churches that we may expect to find the indisputable evidence of authorship for which I am contending.

Commencing the enquiry, then, by selecting the accredited works of the following distinguished men, we shall find how completely the theory I have asserted is proved by a comparison of the buildings they erected in different places. I shall pass over the period anterior to the Norman Conquest, as so much difficulty presents itself in ascertaining with any degree of certainty the actual buildings in England which can be assigned to that date, and notice the works of Gundulph, Bishop of Rochester; Ralph Flambard, Bishop of Durham; Llanfranc, Archbishop of Canterbury; William of Sens; Leffrid, Bishop of Chichester; Henry of Blois, Bishop of Winchester; William of Wykeham, Bishop of Winchester; and Sir Reginald Bray.

First, as to the buildings erected by Gundulph, Bishop of Rochester, and here on the very threshold of the enquiry we are met by the difficulties which belong to subjects of this kind; for recently, doubts have been raised as to the authenticity of buildings hitherto attributed to Gundulph. Historians and antiquaries have so much adopted the opinions of their predecessors, repeating their statements, without making examinations and investigations for themselves, that the public (led by them) have hitherto implicitly believed Gundulph to be the builder of Rochester Castle, and until lately nobody has ever doubted the fact; but it now appears, after the most careful researches, that Rochester Castle (at least the superstructure) belongs to a period a full half a century later than Gundulph's time. The Rev. Mr. Hartshorne, in a most able paper read before the Archæological Institute, last August, at Rochester, produced documents showing that the Castle was erected by Archbishop William de Corbeul in the years 1123 to 1139,* but the language of the deed from which this fact is established leaves it doubtful whether the basement of the Castle might not be of earlier date; and a fair comparison of Gundulph's authenticated work at Malling Castle with the fragmentary portions of the early Norman work in Rochester Cathedral and the parts of the basement of the Castle, show such a marked manner in the masonry and jointing so entirely unlike the other Norman portion, that one cannot err in ascribing the work to one and the same hand; in the very mortar there is a peculiarity not met with usually in Norman work. Both at Malling and Rochester the mortar consists of a sort of tuffa, found only in the Cliffs of Dover; this material appears to have been exclusively used in the work by Gundulph. The later construction has no such distinctive quality, and is of the ordinary Norman character.

A difficulty of another kind has been raised, in which it has been gravely questioned whether Gundulph really possessed such skill in architecture as to render it probable that he designed and superintended the works ascribed to him at all; in truth, whether he was more than the presiding Bishop of the Diocese at the time when the Cathedral works were going on, the buildings being erected by some master mason, and carried out by him during the episcopate of Gundulph. Now without attempting here to enter upon a topic which has been so much agitated lately, tending to throw doubt upon the received opinions concerning the founders of some of our great ecclesiastical buildings, it certainly may be safely assumed that Gundulph was distinguished for his skill in building, for Ernulphus, his successor in the See of Rochester, says of him, "Gundulphus in opere commentarii plurimum sciens et efficax erat;" expressions which could certainly not be applicable to him merely in his episcopal capacity, but which pointedly refers to his constructive skill; and why should any one be desirous of depriving Gundulph or his ecclesiastical successors of the merit which belongs to them in connection with the great works associated with their names? Education in those early times must have been limited. The laity had too much occupation in feudal contests in the protection of their homes to prosecute the study of art or science, and those tranquil pursuits were necessarily restricted to the cloistered brethren, whose undisturbed lives gave them opportunities for cultivating the sciences, and whose religious zeal, and the desire of increasing the splendour of God's house, naturally led them to the practical exercise of architecture.

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* In the Chronicle of Gervase, the faithful historian of the Cathedral, he states that King Stephen gave and confirmed to the Church of Canterbury and to William the Archbishop the Castle that was in the City of Rochester, where the same Archbishop built an extremely beautiful tower. This valuable passage is conclusive, and removes all doubt of its author from dispute.

Gundulph, originally a monk of the Abbey of Bec, in Normandy, was invited by Lanfranc, Archbishop of Canterbury, to England in 1077, and by that prelate's influence raised to the See of Rochester. The incidents in the life of this eminent ecclesiastic have been most graphically described by the Rev. Dr. Hook, the learned Dean of Chichester, in a paper read by him before the Archæological Institute at their last Congress at Rochester. The tastes of the patron and protegé were congenial, and we may easily imagine that the Archbishop saw in Gundulph the capabilities for architecture which might be exercised with advantage in the growing wants of the Anglican church.

Gundulph was born in that part of Normady called the Vexin. As he died in 1108, being then in his eighty-fifth year, we may fix the date of his birth somewhere in the year 1023. Of his family little is known. Gundulph received his primary education in his native place, and when he had mastered all the learning he could receive at home, he was removed to Rouen. Here his good conduct did not escape the observation of William Archbishop of Rouen. From Rouen he was induced to make a pilgrimage to the Holy Land, where he encountered many hardships, and on his return was nearly shipwrecked; in gratitude for his preservation he resolved to devote himself to a religious life, and entered the monastery of Bec, in Normandy, where he became a Benedictine monk. Here he formed the friendship of the good and learned Anselm. Gundulph appears to have been of a most sensitive disposition. Dr. Hook observes, when giving many incidents of his life, that there is nothing more remarkable in the history of Gundulph than "his copious weeping;" he seems to have encouraged it as a virtue. In every respect his character as an ecclesiastic contrasts favorably with Flambard. He possessed as many good moral qualities as Flambard was cursed by bad. While Gundulph was sacrist works on a large scale were being carried on at the Monastery of Bec, and this practical man was thus directed to the study of architecture. Had he commenced those studies sooner he would probably have profited by the specimens of Saracenic art which must have met his eye in the East, but we do not trace the influence of his travels in any of the works in which he is said to have been concerned. It was no doubt on the ground of his skill in architecture, that when the Prior of Bec became Abbot of St. Stephen's, in Caen, he sought the assistance of Gundulph. The migration of Gundulph to Caen took place about the year 1066. The works at St. Stephen's were incomplete, therefore he could pursue his architectural studies, and obtain that practical knowledge which he afterwards turned to good account. Gundulph followed the fortunes of Lanfranc, and when Lanfranc was settled at Canterbury he sent for Gundulph, who aided him in his architectural works, and was otherwise employed by him in important negotiations. Meanwhile higher honours were in store for Gundulph. The See of Rochester was vacant. The Archbishop in relation to this small See stood in the position of the king, and through Lanfranc's liberality the bishopric was conferred upon Gundulph. He found the cathedral in such a state of dilapidation, that repairs would be useless. Gundulph offered to procure the funds, not only for rebuilding, but also for increased endowment of the church. In his own person, notwithstanding his engagements as a bishop, an architect and a politician, he exhibited as far as circumstances would permit a model of monastic propriety; he did not permit his monks to eat the bread of idleness, and some of them rendered him assistance in his great architectural works. Gundulph now assumed that character by which he is best known in modern times—the character of an architect. How far his scientific knowledge was employed on those buildings which were erected under his eye at Bec, at Caen, and at Canterbury we are left to conjecture. I am indebted to the Dean of Chichester for these brief notices of Gundulph's career, and to those who take an interest in biography

I heartily recommend the perusal of his learned and amusing paper, which will shortly be published in the transactions of the Archæological Institute. Dartford Church and Darent Church are also said to have been built by Gundulph. The tower of Dartford agrees so closely in character with his other buildings that there can be little doubt it was erected by him, but the Church of Darent does not present the same unmistakeable evidences, and I agree with Mr. Parker that this building is of later date. There is, however, another building, Leeds Church, the masonry of which is so like that of Malling and the tower of Rochester that I think it may be viewed as the work of Gundulph. The White Tower of London, being one of Gundulph's last works, shows much more finish in its details, and is less rude and rough in its construction than the buildings which he erected in Kent, where having to deal with a rough rag stone, the work is less finished.

One of the earliest instances of the manner in which the Norman architects repeated themselves is given in Professor Willis's "Architectural History of Canterbury Cathedral." Speaking of Lanfranc, and the buildings which he erected at Canterbury, he says:—"Now Lanfranc, before he was made Archbishop of Canterbury, was the first abbot of the monastery of St. Stephen's, at Caen, the church of which was built under his direction; begun in 1064, and dedicated 1077, after his appointment to Canterbury." The two churches were therefore in building at the same time. The church of Caen, like that of Canterbury, has had its original choir replaced by one in the style of the thirteenth century, probably for a similar reason—enlargement. The portions which it retains are alike in plan and arrangement to the corresponding parts of Canterbury; alike in the number of piers; in having western towers, transepts without aisles, a central tower, eastern chapels to the transepts, and the pillars and vault at the end of each transept; nay, even in dimensions they are, with slight difference, the same. The breadth between the walls of St. Stephen's is 73 feet, which is one foot greater than at Canterbury. The extreme length of the transept is 127 feet; also that of Canterbury is the same. The width of the central alleys was apparently less at Canterbury than at Caen. We cannot now tell whether this singular, and I believe hitherto unnoticed, resemblance between the two churches extended also to the elevations, for no fragment remains at Canterbury from which to judge, except the western tower, which is not the same in decoration; but, as western towers were the last things finished, deviation might have occurred here, although the rest was the same."

The next example which I shall mention where a close resemblance to an architect's other works is to be traced, may be found by comparing the works of Bishop Ralph Flambard, a distinguished architect, contemporaneous with Bishop Lanfranc. Flambard was a native of Bayeux, in Normandy, and his ultimate advancement in England to the princely bishopric of Durham, by the favour of William Rufus, was remarkable. He filled so important a position in his day that a sketch of his character must not be omitted when noting his works, and I will avail myself of the very graphic account of his life as drawn by the Rev. Mackenzie Walcott for introduction here. He says:—"Ralph Flambard, or Passeflabere, was the son of Thurston, a village priest of Bayeux, and his mother was reputed to be a witch, and familiar with demons. The Saxon chronicles say that, as justice of Eyre, he held the gemot, or King's court, throughout England. He was the first author of a work in English law; and, singular to say, Leland mentions that the library of Christchurch (of which he was dean) contained only a single volume of Saxon laws. Henry of Huntingdon and Odericus say that the king called him Flambard (devouring flame) from his insolence. He, however, appears under that name as a land-owner in Doomesday. He lessened the estates of the farmers, and was execrated for his exactions. With his brother Fulcher, the infamous Bishop of Liseux, he distrained the rents and property of English bishops. On the death of his brother Fulcher, he endeavoured to obtain the see of Liseux for his son Thomas. His son Elias succeeded him in his stall at Lincoln, and he had a brother named Geoffrey.

He was vicar of Godalming, chaplain to Bishop Maurice, of London, and the King, Prebendary of Lincoln and St. Pauls, Procurator-General, Chief Justiciary, Lord Treasurer to Henry I., Prime Minister, and a most unprincipled courtier. In 1099, Ralph was consecrated Bishop of Durham, on June 4th, in St. Paul's cathedral, having previously been compelled to give £1000 to the king for his promotion. In 1088, the king gave him the chaplaincy to the abbey of Winchester; in 1089, the archbishopric of Canterbury, when, to secure his promotion, he gave the king all he could; in 1092, the bishopric of Lincoln and abbey of Chertsey. He was the most subtle of men in evil; he robbed every church under his charge, and reduced rich and poor to such indigence that they preferred death to life under him. In 1095, the kingdom was entrusted to him, while he held sixteen churches, cathedrals, and abbeys, without bishop or abbot, which he reduced to the depths of poverty. He invented new offences in order to create fines; introduced money compensations for crimes; and, like a true Erastian, recommended that temporalities during the vacancy of a see should devolve on the crown, while he made simonical contracts with aspirants to the mitre before he would recommend them to the king. One archbishopric, four sees, and eleven abbeys were in consequence kept in the king's hands for years, and remained unfilled. He was committed to the Tower, where he was allowed two shillings a day (equal to thirty shillings sterling), on a charge of malversation, August, 1100; but he contrived to intoxicate his keepers, and escape by means of a rope, which had been concealed in a pitcher of wine, on February 4th, 1101, cutting his ungloved hands to the bone in the act. He fled to Normandy, where he endeavoured to incite Duke Robert into rebellion, and accompanied him in his invasion: he was restored to his see in 1107, after the retirement of that prince. Finding that his death was approaching, he caused himself to be carried into the minster, and, by offering of a ring before the high altar, made restitution to the prior of several possessions and privileges which he had detained by violence. He died September 5th, 1128, and was buried at Durham cathedral, the nave of which he built. He was a great architect, and besides the nave of Christchurch and Durham, he erected Norham Castle, Mottesford Priory, county of Lincoln, and Kepyer Hospital, Durham.

I could not resist giving you this biographical sketch of one of our greatest ecclesiastical architects of the twelfth century. With his moral character, however, we have nothing to do, and though we may execrate his vices, we are not at liberty to repudiate his surpassing skill in science and art, on which I now proceed to speak. Of his castellated buildings there is not much to say; time and its attendant vicissitudes have robbed the building of all its prominent architectural features, and little can be discerned to identify the castle with its first builder. Successive Bishops of Durham from time to time strengthened this border fortress, and increased its fortifications. Shattered and dismantled it now stands—a majestic ruin—distinguished by its grand position in the far-famed charm of Scotland's poet:—

"Day set on Norham's castled steep;
On Tweed's fair river, broad and deep—
And Cheviot's mountains lone.
The battled towers, the donjon keep,
The loop-hole grates where captives weep,
The flanking walls that round it sweep,
In yellow lustre shone."

We have it upon undoubted historical evidence that Hugh Pudsey, Bishop of Durham, received orders from King Stephen to build a castle upon the Tweed at Norham, which had formerly been erected by Bishop Flambard, and destroyed by the Scots; the remains, therefore, we now see, and which evoked the spirited lines above quoted, are probably only the ruins of the later castle erected by Hugh Pudsey, who, indeed, was little inferior as an architect to his notorious predecessor Flambard.

It appears that Flambard was elected Dean of the Priory Church of Christchurch, Twynham, at the latter end of the eleventh century, and contemplated the entire rebuilding of that church upon an enlarged scale, but his rapid promotion prevented the fulfilment of his intention; he, however, built the fine Norman nave and transept, and had commenced other works there, which were suspended on his removal, and subsequently completed in the early English style which so soon followed.

A description of the noble nave of Christchurch is here desirable, in order to show the distinctive character of Flambard's architecture and the dissimilarity of his style from other great Norman works then constructing in England, and also to identify his detailed manner both at Christchurch and Durham. The nave of Christchurch consists of seven bays; every bay is divided by a clustered group of semicircular shafts, separated by square piers, each shaft having a capital ornamented with the peculiar foliage resembling the Grecian honey-suckle, these again carrying semi-circular arches slightly, stilted with square and semi-round members corresponding to the shafts below. Two of the shafts facing the nave and dividing the bays, rise through the triforium and terminate a little short of the clerestory, where some transitional corbels of peculiar form, grafted upon the Norman shafts, form the springers of early English vaulting. The spandril walls of the lower arcade are ornamented with hatch-work and fish scales; a stringcourse of chevron-ornament crowns the arcade, whence springs the triforium, each bay containing double engaged circular columns, carrying a bold semicircular arch, enclosing coupled arches in a second order resting on a central column and corresponding engaged shafts.

The peculiar feature of this design consists in the point at which the groining springs, being some feet below the path of the clerestory or upper wall passage. As a general rule the groining springs on a level with the clerestory, whereas both here and at Durham the vaulting starts from an unusually low position. It is somewhat remarkable that neither at Christchurch nor Durham did Flambard complete the clerestory or groining. The manner of Flambard is at once original and marked, both at Christchurch and Durham he adopts the same peculiarity.

Again, in comparing the aisles of the two churches it will be seen that the wall spaces under the windows are ornamented by bold arcades, both within and without. At Christchurch the inner arcading consists of semi-circular arches on detached round shafts, and externally are discoverable (though covered by later work) the traces of bold intersecting arches and columns, such as may be found all round the north transept. At Durham, by way of difference, the reverse arrangement occurs; internally we have the intersecting arches, and outside the range of semi-circular arches on single shafts. Nor do general resemblances end here; in the mode of lighting the triforium we perceive the identical disposition of single light windows, and attached to the rear of the great piers are well defined flat projections, with corresponding projections against the outer walls, evidently built to receive semicircular arches, which by their bulk should act as counterforts to groining. At Christchurch the piers only are executed, but they are finished with a well moulded abacus; at Durham, where the arches are completed, this feature is wanting, but I think these preparations may be taken as conclusive evidence that Flambard intended each building to be groined, though this particular work was not carried into effect in his day, but somewhat later. So far, in many respects, the works of this great architect carry the impress of his manner, and in noticing the points of departure we observe that they are such as would follow in consequence of the increased scale of the cathedral over the conventual church.

The nave of Durham is one of the most grand and imposing interiors in this country. The introduction of the massive cylindrical column alternately with the clustered piers is most happy in effect. Flambard did not live to carry out his full intention at Durham, either by stone groining or flat ceiling, as at Peterborough, yet the preparations above alluded to show what he would have done; and we cannot but commend the good taste of his successor, Prior Melsonby, who notwithstanding the change of style which had taken place, and the prevalence of the pointed arch in his day, yet still availed himself of the semi-circular instead of pointed vaulting, and thus completed the work of Flambard in one homogenous style.

By the way, I may mention another instance of this deference to the intention of a previous architect, though of much later date; it occurs in the cloisters of Norwich Cathedral. These cloisters were commenced by Bishop Walpole in 1297, but his death took place before he had proceeded far with his work. Richard Uppingham, who succeeded him, built three compartments more; he was followed by Bishop Salmon, who erected five compartments, with the whole of the south wall. The north wall, forming the completion of this famous cloister, was effected in the time of Walter Worsted, Prior of the Church, in 1430. Yet though this cloister was built at different times and by different persons, we find a general uniformity of style prevail in the details of the columns, capitals and groining, and even to many of the mouldings of the four sides. This was certainly not the usual practice of those times; each man generally built his portion in the advancing style of his day, without regard to congruity with the work of his predecessor, and so marked a departure is deserving of special notice. But to return to Flambard. There is another kind of external decoration, both at Christchurch and Durham, in the bold lattice or reticulated work, which is evidently peculiar to him. In the round turret of the north-east angle of the north transept of Christchurch this lattice work ornamentation is most striking and effective; it is really like a net formed by large ropes girting the masonry and holding it together. Its application to a round structure on such a scale is perfectly unique, and it is difficult to resist the supposition that some kind of symbolism was intended by the composition: the spandrils of the intersecting wall arcade are wrought with the fish-scale and herring-bone channelling, while the twisted columns by their varied convolutions seem borrowed from the shells abounding on the shores of the sea close by. The gable of the south transept of Durham Cathedral is filled with this net-work device, and also the lower stage of the west end of the Galillea Chapel. I am not aware that any other Norman building possesses this ornamentation upon so large a scale; there is a little of the kind in the south front of Rochester Cathedral, but so diminutive in its proportions that it merits little notice. In the drawings of the compartments of the naves of Christchurch and Durham will be observed the close resemblance which exists between them, and by contrasting them with those of Romsey Abbey (not far from Christchurch) and the Cathedral at Oxford, it will be apparent how totally unlike they are to each other in all respects, and how completely the former work is the production of a different mind.

The next remarkable example of close resemblance between the works of the same architect belongs to the period of the thirteenth century, when the first pointed style had become generally developed in England and France. Here again I shall refer to our greatest authority in the discrimination of works belonging to different periods. Professor Willis having unravelled some of the most difficult problems which before his time had puzzled antiquaries, who for the want of scientific knowledge so largely possessed by Willis, could only hazard conjecture upon the ages of ancient workmanship. The Professor, bringing to bear upon these subjects a great amount of practical knowledge, has placed beyond the possibility of doubt the correct lines of demarcation between masses of masonry welded together at different periods, and presenting to the less informed archæologist matters of doubtful date.

In reference, then, to the portions of Canterbury Cathedral built by William of Sens (not William the Englishman), for two architects named William were employed in succession upon the Metropolitan

Church; Professor Willis remarks: "It is certain that the pillars to the choir, with the pier arches and the clerestory walls above, are wholly the work of William of Sens." This result the Professor arrives at from the internal evidence which the building affords, and by the aid of the historical account of the rebuilding furnished by Gervase the Monk, of Canterbury. Let us now see how far this assumed work at Canterbury harmonizes or corresponds in character with other buildings designed by William of Sens elsewhere. Referring, then, to the Cathedral at Sens, a considerable part of which was designed by him, we are struck at once with the close resemblanee between the choirs of Sens and Canterbury both in plan and elevation; each terminate in an apse of seven sides, the compartments are separated by single round pillars, having bold capitals with square abaci carrying simple but effective moulded arches: above are the openings of the triforium, each bay comprises two arches and pillars in a secondary order; above is a lofty coupled clerestory window, filling up the bay of vaulting. Single vaulting shafts spring from the capitals of the lower arcade and rise to the top of the triforium where the stone vaulting commences. Nor does the general resemblance end here; the very details are the same, and the section of the base referred to by Professor Willis is identical with the bases employed at Sens Cathedral. Take now the design of any other cathedral of the same date, either Noyon or Bourges, and observe how totally unlike are the proportions and arrangements. Although each example shows great artistic power, this composition is so distinct that the hand of a different artist is immediately observable, but looking at the two buildings referred to, viz., Sens and Canterbury Cathedral, if historical records were wholly wanting, we might without hesitation declare that the two buildings were designed by the same architect owing to the mannerism so remarkably evident in both structures. I do not use this term in depreciation of such undoubtedly beautiful architecture, but simply as proving how difficult it is for any man to divest himself of certain trammels whereby he involuntary repeats himself.

In the lecture read by Mr. Scott before this Institute, entitled "Gleanings from Westminster Abbey," he remarks upon the essentially French character in the details of Canterbury choir as distinguished from the vernacular architecture of the thirteenth century. This again may be cited as a proof of William of Sens continental manner.

It may here be remarked that it was not improbable some English architects who had opportunities of travelling abroad, and there seen buildings erected in France and Germany upon plans and principles then unknown to them, may have adopted their novel arrangements. In this manner Mr. Scott accounts for the peculiar design of the chevet forming the east end of St. Peter's Church, Westminster. He says, "There can be little doubt that King Henry III, during his sojourn in France, became enamoured of this arrangement, which in its perfected form he may have seen in course of being carried out at Amiens, Beauvais, Rheims, and elsewhere. It would naturally strike him as being well suited to the reconstruction of the eastern portion of a church already possessing an apse with a continuous aisle. Judging from internal evidence, which is all we have to go upon till the public documents and the archives of the abbey are more thoroughly searched, I should imagine that an English architect or master of the works was commissioned to visit the great cathedrals then in progress of erection in France, with a view of making his design or the general idea suggested by them. Would that, like his contemporary Vilars de Honecort, he had bequeathed to us his sketch book."

The general resemblance here referred to does not amount to any proof of identity between the building and its architect, such as I have sought to prove in the earlier churches I have mentioned, but it is a most interesting fact, as stated by Mr. Scott, that Westminster Abbey is the only introduction into England of the perfect French arrangement of chapels at the eastern extremity of the church, as a chevet, a combination of design beautiful beyond comparison; indeed, the square termini of our cathedrals are not worthy to be considered, or in any degree equivalent to the charm of those groups of radiating chapels at Amiens, Beauvais, Le Mans, Cologne, Prague, and elsewhere, and it seems rather remarkable that when other buildings were really copied almost literally by their architects and transplanted into England, so beautiful an arrangement as the chevet, of which Westminster Abbey affords a noble example, should not have taken root in this island.

In the minute particulars arising out of the comparison of the east end of Westminster with the contemporaneous churches of France, Mr. Scott mentions remarkable points of difference and an absence of any such marks as might be sufficient to refer this masterpiece of design and construction to any known architect, neither could he detect a French character in the details, although the composition is so essentially and singularly foreign. In this respect Westminster Abbey stands almost alone. It is indeed a building of marvellous beauty internally; its lofty arcade, richly diapered sprandrils, deeply moulded triforium, with its double order of traceried arches surmounted by lofty clerestory windows, form a composition hardly to be surpassed. Nor is there any cathedral bearing close resemblance to it. Yet strange to say, the nave of this building has been often compared with the nave of Rheims Cathedral, to which it bears very little similarity, Westminster being infinitely superior, excepting always the west front of Rheims, which is a composition of matchless beauty and a perfect marvel of sculpture. The only reason one can assign for its being put in comparison with Rheims is, that like Westminster it has been the church generally chosen for coronations.

Professor Willis adduces other remarkable repetitions of Ernulf's work at Canterbury and Rochester, both in the walls, arcades, and singular diapering. And in William of Sens' work, the base mouldings of the columns employed by him at Sens cathedral and Canterbury are identical; we might even assert that the masons used the same face mouldings.

Take again another example between the work of Bishop Leffrid II., who is known to have completed the cathedral of Chichester in 1199, where the round and square abaci occur in juxtaposition, and the details of the conventual church of Boxgrove, close by Watlington. Nobody examining the details of these buildings can doubt that they were the work of the same hand: the practised eye at once detects the characteristic marks; and, although the archives of the conventual church afford no information concerning the builder, we can unhesitatingly affirm that Bishop Leffrid must have been engaged both on the capitular and conventual edifices. Mr. Petit, in his paper upon Boxgrove church, read before the meeting of the Archæological Institute in 1859, bears testimony to the same effect. He says:—"I think any antiquary would be disposed to assign this church to the first quarter of the thirteenth century; and a comparison of it with the presbytery of Chichester, of which the date is accurately ascertained, would confirm him in the suggestion. For the pew arches, with their circumscribing arch, and the clerestory of Boxgrove, are so like the triforium and clerestory in the cathedral, that one might imagine them to be designed by the same person; at all events, copied within a short time; and there is a great similarity also in the mouldings."

Another illustration of this kind is afforded by an examination of the architecture of the beautiful church of St. Cross, near Winchester. The hospital was founded in 1136, by Henry de Blois, Bishop of Winchester, to whom also is attributed the design of the abbey church of Romsey. Like that church, it seems to have been built from one uniform plan; but, being erected during a transitional period, exhibits all the variety of detail incidental to the architectural movements then in progress. An examination of the east end of the choir of St. Cross shows in many parts such a striking resemblance to portions of Romsey, that we have here unmistakable proofs of the same hand; not only are the details almost fac-similes, but a singularity of composition pervades both buildings in the greater decoration of the north sides of each building. At Romsey, the arcade which adorns the clerestory on the north side is altogether wanting towards the south; and at St. Cross, the windows which on the south side are quite plain both in the aisle and clerestory, are on the north side richly ornamented. Whatever may be the reason for this singularity of design the coincidence is noteworthy. There is another large and interesting church in the diocese of Winchester, less known than Romsey, St. Cross, Christchurch, but possessing much architectural beauty. I refer to the Church of All Saints, at Crondall, near Farnham. When called upon some years since to report upon the condition of the chancel of this church, I was much struck with the resemblance of many of its details to those of St. Cross. I could even trace the same face-moulds in the abaci and aisle mouldings. Upon investigating the history of the building, I learned that the church was founded by the same Henry of Blois, Bishop of Winchester—the munificent founder of St. Cross and builder of Farnham Castle; and hence was at once explained that identity of character which had arrested my notice without any previous knowledge of authorship.

In the preceding remarks upon the buildings of St. Etienne, at Caen, and the Norman structure of Canterbury cathedral, Flambard's Christchurch, and Durham, Sens cathedral, and Canterbury cathedral choir, the marks of resemblance have been confined to parts of each building only, and some of the details; but it is believed that if the proportions of each structure were compared, a rule of composition would be deducible, peculiar to the designer of each building. Professor Willis has, indeed, noticed this in commenting upon Lanfranc's work at Canterbury; but descending two centuries later, we come to the grand buildings erected by William of Wykeham. The works of this great architect are well worthy the attentive study of every true lover of ancient art. His fame and works are too well known to need any lengthened account here, and it would be beside my object to enter upon such task; but his buildings afford another illustration of my theory. Those present who are acquainted with the details of his architecture at Winchester Cathedral, and the Colleges of Winchester and New College, Oxford, cannot fail to discover the unerring marks of this great master in these buildings. Remarkable as are the proportions and details of his superstructures, there is yet a charm in the proportions of his buildings which has been justly attributed to some rules in the distribution of the parts of his plans, which are identical in his Chapels at Winchester and Oxford, and not discoverable in the other collegiate chapels. In a most interesting and learned paper upon the works of William of Wykeham, read by our late respected President, Professor Cockerell, before the members of the Archæological Institute, at their Winchester meeting, under the presidency of the Marquis of Northampton, in 1845, the Professor dwells much upon various ichnographic geometrical proportions which governed the plans of many structures; and, in reference to Wykeham's buildings, he proves most satisfactorily that the pleasure which is derived from the contemplation of the chapels at New College and Winchester is entirely due to harmony of proportion reduced to a geometrical scale; and by comparing these chapels with others at Oxford, the contrast is at once observable. Here, again, we have unquestionable marks establishing the individuality of the architect, though rather in the matter of general composition than details. By instituting a parallel between the known works of eminent mediæval architects, there can be little doubt that rules of proportion would be eliminated. The investigation of this subject, however, would require much care; hasty conclusions must not be drawn; the mere circumstance that one or two mouldings agree in their proportions does not establish a general rule. The use of identical details and separate features of design may afford strong presumptive evidence of authorities, and be convincing; but the mere general similarity of proportion is not so sure a test for discovering the name of the builder as the first mentioned peculiarity. Many able men have laboured hard to prove and establish a system or theory upon which they believe all ecclesiastical buildings to have been designed. Amongst the most recent is Professor Henzleman. The wonderful industry which this gentleman shewed in collecting examples, and entering into the most minute calculations, almost exceeds belief. This subject, as some of my audience will recollect, was brought under the notice of the Institute by Professor Henzleman, in December, 1852; and so much importance was attached to his assertions, that a committee was appointed by the council to confer with the author, and investigate the whole subject. This interesting task was delegated to the late Sir Charles Barry, Mr. Scott, and myself. We had several meetings with Mr. Henzleman, and heard attentively all he advanced in support of his theory, but his conclusions were not such as to produce conviction. He appeared to have constructed numerous scales, and, by applying one or other of them to a building, showed that certain parts of the structure consisted either in plan or elevation of some fractional part of the scale. It would be difficult to meet with any building, either ancient or modern, which would not be conformable to this mode of mensuration. It establishes no principle whatever, and determines nothing.

Now, in the cases which I have hitherto mentioned the resemblances are not confined to small portions of each building, but extend to the general plan and design of the structure. Let me now, however, allude to the leading feature in an abbey church, which is so marvellously like the tower of another cathedral church that though in other respects the design bears no similarity, it is scarcely possible to doubt but that the same builder must have been concerned in both structures. It may be that the architect, satisfied and pleased with his erection in the south-west of England, was content to repeat his work in a midland county. I refer to what remains of the once magnificent Abbey Church of Pershore, near Worcester. Probably those who merely know the building by its general outline and character will be surprised to hear that the tower (or rather the two stages of it) which remain above the roof, are so like the two corresponding stages of the base of Salisbury Cathedral spire as to be almost identical in design. The composition may be thus described:—The first story rising out of the junction of the nave, transepts and choir, has double couplet windows set upon the acutely pointed weather mouldings of the roofs, the heads of these windows only are pierced, each angle of the tower has bold but peculiar turrets, and this peculiarity exists also at Salisbury; the north-east turret containing the stairs, being larger than the other three, and perforated with numerous slit lights. This stage terminates with a bold projecting stringcourse and ornamentally embattled parapet, the stringcourse profusely ornamented with the ball flowers. Above this rises the second or belfry stage, upon a set off all round. This stage is highly ornamented on each side, and may be represented as consisting of four richly carved compartments with traceried and gabled canopies, each separated by small buttresses and pinnacles. The two centre compartments form window openings, the others are blank, but have mullions and tracery heads like the rest. This stage has also a stringcourse with ball flowers; at present the tower terminates here abruptly with a parapet. There can be no doubt that it was intended to be loftier, though from some unforeseen cause it ends it its present truncated shape. Now, according to the rules of probability we should have looked for the characteristic resemblance of this tower with that of the cathedral church of Worcester, but it is utterly unlike. There is, however, in the style and architectural features of the choir, ladye chapel and small transepts of Worcester Cathedral a close correspondence with the like portions of Salisbury Cathedral, and it is very singular that the tower of Pershore should be so uncommonly like the lower part of the central tower of Salisbury Cathedral also. Upon examining the accounts which are handed down to us relating to Pershore, there is a list of the abbots who presided over the abbey from the Conquest to the period of the dissolution of the establishment at the Reformation, and some incidental notices are given of the building of the Abbey Church. No mention is made respecting the erection of the beautiful choir, central tower and ladye chapel, but reference is made to the devastation which the building suffered by fire at different times. In Nash's "History of Worcester," and in the valuable collection of the

Pratlington Manuscripts in the Library of the Society of Antiquaries, which I have carefully searched, I can discover no clue to the architect of the remains of this beautiful structure. Remembering, however, the proximity of Pershore to the famous Abbey of Evesham, and the fact that more than one of the monks of the former was Abbot of Evesham, I sought for the list of the abbots of this once stately monastery, and found a goodly description of them in Nash's "History of Evesham," and curiously enough discovered the following entry:—"William de Wytechurch or Marlborough, Monk of Pershore, and afterwards Abbot of Evesham, 1282," and it is added that in his time and that of his successor extensive progress was made in the building of the Abbey Church, &c. Now this William de Wytechurch, in Wiltshire, if not connected with the church at Sarum, must have been familiar with the architectural works then being carried forward within twenty miles of his birth-place, the fame of which was famous throughout England. It is known that the cathedral at New Sarum was began in the middle of the thirteenth century, and took more than forty years in building. Now nothing can be more probable than that William de Wytechurch, struck with the beauty of the works at the cathedral church of Sarum, either brought with him from Wiltshire the master mason or became himself the architect of the tower of Pershore, adopting the design of the tower of Salisbury. Whether the tower and spire at Pershore were ever completed there is no evidence to show, and though it is recorded that the former tower built in the Norman style fell, there is no tradition of a similar disaster happening to the building of the thirteenth century. I however strongly incline to the belief that the tower and spire were finished, and that some calamity afterwards happened, leaving the lower part in its present unfinished condition. We can judge how imperfect must have been the construction, which imposed the necessity of building the huge raking buttress at the north-east angle, which, though boldly designed, greatly injures the external effect of the church. Any one comparing the towers of Worcester Cathedral and Pershore must at once see how much more masterly are the details of the latter, and it is further no rash supposition to infer that the architect of Pershore may have had some connection with those other portions of the Church of Worcester, which also bear so much similarity to Salisbury.

Applying the test which has been dwelt upon in the preceding remarks to one of the most beautiful towers in Somerset (I mean St. Mary's tower, Taunton), a popular notion respecting that structure will be refuted; or rather I should say the former structure, though I must here state that the new tower, built under the superintendence of Mr. Scott and myself, is a careful facsimile in every respect of the ancient design. This tower was said by many to have been designed by Sir Reginald Bray, whose undoubted works at St. George's Chapel, Windsor, and Great Malvern, are well known. This conclusion rests only for its foundation upon the circumstance that the initials R. B. were carved upon some shields ornamenting the transoms of the belfry windows, and which letters have been claimed as the initials of the great architect. Now Sir Reginald succeeded Bishop Beauchamp as surveyor of the works at St. George's Chapel; and it will be observed how profusely his arms and devices are scattered over the nave and transepts of that chapel; whereas, the letters R. B. are the only marks sculptured upon the shields on the tower, forming too slender grounds for identifying the building with Sir Reginald Bray; and I am satisfied that no intelligent antiquary or architect on comparing St. George's Chapel and Bray's other works with the tower of St. Mary's, would believe that the latter could have been designed by him (although built probably about the same time). There is no similarity either in composition or detail, or a single point of coincidence between the buildings. St George's Chapel has its arcades, stone vaulting, and windows constructed throughout with depressed four-centred arches. The greater part also of Malvern Abbey Church is constructed in a similar manner; and the details have not the spirit which was so beautifully carried out at St. Mary's, Taunton, where all the fenestral features and panelling were elegantly designed, with arches of two centres only; neither do the sunk mouldings of the window jambs show any such resemblance in section as we might expect to find in works of the same artist; it is also most unlikely that so distinguished a man as Bray would have omitted to place either his arms or devices in some prominent position, whilst we see that elsewhere he used them so freely as ornaments to his buildings. I think, therefore, this tower may with much more truth be assigned to Richard Beare, an abbot of the great Abbey of Glastonbury in the the same diocese. The same letters R. B., accompanied with the mitre (he being a mitred Abbot), are to be found on St. Benedict's Church, Glastonbury, and also on some Alms-houses situated in the outskirts of the town of Taunton. I am far from supposing that any great architect would tamely repeat the identical mouldings generally; yet there can be no doubt that some men have preference for peculiar forms, proportions, and details, which are therefore always observable in their works, and often form criterea by which, in the absence of other proofs, their buildings may be recognized. Everybody knows that in the sister art of Painting, the works of distinguished painters are clearly discovered by the peculiarities of colour, style, and treatment; and a connoisseur will tell you with certainty the name of the artist whose works are placed before him without the aid of initials or autograph. So also in sculpture, though perhaps with somewhat less certainty; yet there are marks by which the sculptor's work may be identified, notwithstanding the want of historical evidence. It would, I think, be very interesting to institute a careful comparison between the magnificent monumental remains throughout the cathedrals and churches of this country. The name of the artist who designed the splendid canopied tombs of Crouchback and Aymer de Valence is unknown; but in all probability it was the same artist who designed the monuments of Gervase Alard, Admiral of the Cinque Ports, erected in Winchelsea church. The composition and details are so like in style as to justify this belief. There are other monuments, such as Archbishop Peckham, in Canterbury cathedral, of a less ambitious character, which would seem to proceed from the same hand. Coming to a later period, I may cite the well known monuments also of the Cobham family, in Lingfield church. When examining these tombs with the members of the Surrey Archæological Institute, last August, I was much struck with the remarkable resemblance in the ornamental details of the armour of the knight, and the vestments of his lady, with the habiliments of the effigies of Sir John and Lady Chideock, in the priory church of Christchurch, Hants. Upon referring to an historical account of the Lords of Stourborough Castle, in the last volume of the Surrey Archæological Society, I there learnt that the beautiful tomb with the recumbent figures referred to, represented the second Sir Reginald Cobham and his wife, founders of Lingfield College. This Sir Reginald Cobham and Sir John Chideocke, of Chideocke, in Dorsetshire, his wife's brother, were knighted by Henry VI., in the fourth year of his reign. What is more probable, therefore, than that the same sculptor should be employed by the descendants of these related persons in the design and erection of their joint family tombs? It is only to be regretted that the name of the sculptor who could produce such beautiful figures is unknown. There are, again, numerous magnificent chantries and tombs in our cathedral and abbey churches, erected about the time of Henry VIII., when the admixture of classical details with Mediæval forms produced the Renaissance style, which may be attributed to the workmanship of one man.

It is well known that at this period eminent Italian artists were brought into England at the instance of Henry VII. and his distinguished nobles. A few years since, interesting documents were found recording minutely the contracts entered into with Pietro Torrigiano, the painter and sculptor of Florence (who came over in 1512), for the erection of the tomb to Henry VII., and also for a contemplated tomb for Henry VIII. and Queen Katharine. The identical arabesque ornamentation of the friezes and pilasters of Henry VII.'s tomb are repeated upon parts of the beautiful chantry chapel of Margaret, Countess of Salisbury, in Christchurch Priory Church; and his work, I think, can be traced in many other monumental shrines of distinguished personages in our cathedrals and large churches. Sufficient has been advanced to show what an interesting field of research in the direction I have indicated lays open to those whose professional tours in the country give them the opportunities of comparing buildings and monuments with each other, and I think it is peculiarly the province of the professional architect to pursue this course. No opinion of the mere antiquarian, if unaccompanied by some knowledge of construction, can be conclusive.

The PRESIDENT, PROFESSOR DONALDSON, having invited some observations on the paper—

Mr. BERESFORD-HOPE, Hon. Fellow, said although he had not made a minute study of the buildings of the class on which Mr. Ferrey had discoursed, which as an amateur he delighted to do, he could testify to the pleasure they must all feel at the collection of examples which that gentleman had brought before them to illustrate the gradual working out of those difficulties, which with increasing knowledge they must more and more recognize as existing in the history of Mediæval architecture. In those ages there was neither the rapid transmission of ideas nor of materials which existed in the present day. The history of the professional education of the men who practised, the way in which working drawings seemed to have passed from hand to hand as a kind of cherished property, were among the incidents of architectural progress which he feared they would never be able to fathom.

Mr. WYATT PAPWORTH, Fellow, said it perhaps would be remembered he had submitted two papers to the Institute of a similar character to that they had just heard; and being greatly interested in the subject, he rose with great pleasure to move that the best thanks of the meeting be given to Mr. Ferrey for his valuable paper; he would append to thăt motion—that he be requested to add to the title, after "Mediæval architects," the words "and builders." He proposed this for the reason that he entirely disagreed with the idea that the persons mentioned could be considered as *architects;* having given some study to the question, from the information he had obtained he could not do otherwise than doubt whether such personages possessed any *architectural* knowledge. With respect to the first mentioned—Gundulf—of whose life such elaborate details had just been given, his friend Mr. Ashpitel and himself had gone carefully through all the documentary evidence on the subject, and both were of opinion that he was no *architect*, as the word was now understood. Mr. Papworth considered that all these archbishops and bishops had master masons, to whom he firmly believed the whole credit of the design and erection of the buildings was due. He thought that when the clergy in early times were promoted from priory to abbey, from abbey to cathedral, and from see to see, that they often took their master mason with them, which would account for the copyism, or at least the great similarity found in certain buildings described by Mr. Ferrey. He had obtained during the last eight or ten years a large mass of materials of a similar nature to that with which the meeting had been favored. The strongest evidences existed that many parts of buildings had been copied one from another; and in his own collection were notices that parts of one structure were proposed to be copied from another. The type exhibited at the mother church was to be seen in the various churches built in the same era around it. Near Ely there are some churches which are acknowledged as having been built by masons employed at the monastic establishment. He believed that in early times the best artificers were principally to be found at the monastic establishments; afterwards they set up for themselves as masons, builders, and so on, in the larger towns. Of all the persons mentioned the only one to whom he could apply the term *architect* was William of Sens. Mr. Ferrey had not given any outline of his life, but documentary evidence existed to show that he was a working mason; and in the well known competition of artificers for carrying out the great work at Canterbury, William of Sens was the one selected as the best master mason: and had not Gervase's account come down to us, the rebuilding would always have been known as the work of "Archbishop Richard, *the architect*." Mr. Ferrey considered that the clergy living in monasteries had "undisturbed lives," and were therefore able to give that attention to the study of architecture, for which the laity had neither the time, nor the means, nor the education. He himself thought it could hardly be possible to find a more busy man than Gundulf, excepting perhaps Flambard, and the words quoted could hardly apply to them. The former was always most actively engaged, as appeared from the historical records that had been handed down to us by a monk who lived a few years after his death; it was hardly to be supposed, therefore, that Gundulf had given personal supervision to the numerous works to which his name was associated; that he was a great *builder* no one could doubt, and the same might very properly be said of Flambard, of William of Wykeham, and of others. They each appeared to have abundant means at command, and they spent them in erecting the fine buildings of which we were so proud, and to which their names had been applied. He thought he had proved that William of Wykeham had his master mason, and it was known that William de Wynford in his early days was the king's mason, and possibly worked for that bishop at Windsor; it was well known that he was employed by him at his college at Winchester, as Wynford's portrait existed there; and also on the works at the cathedral of the same city: he might also have been so at Wykeham's structure of New College, Oxford. Mr. Ferrey had mentioned the cloisters at Norwich Cathedral as having been a long time in hand, yet carried out according to one design; the name of the master mason who commenced that structure was known, and his design was continued through a period of nearly three centuries. In conclusion he (Mr. Papworth) desired to express the great pleasure with which he had listened to the paper, and to bear his testimony to the great acccuracy of the descriptions given of those buildings with which he was acquainted. He would only add, that unless the knowledge of architecture and building possessed by the bishops and ecclesiastics of olden times had been greater than it was at the present day, it certainly would not have attained to any very great eminence.

Mr. **Morris**, Associate, remarked with regard to the circular building pointed out by Mr. Ferrey as charged externally with net-work, shells, and twisted ornaments that had probably some symbolical signification, it seemed to him (Mr. Morris) that they bore what might be termed an aquatic character. This might, he thought, have some relation to the metaphor used by our Saviour in his summons to Peter and Andrew, who from mere catchers of fish were promoted to be apostles and "fishers of men." (Matthew, c. iv, v. 19.) It was also to be recollected that in early Christian ages, previous to the introduction of fonts into churches and the celebration of baptism by priests, that that rite had been exclusively performed by the bishops. There was at Ripon Cathedral a building, older perhaps than the main fabric, and reputed to have been a baptistery; such buildings were generally circular. Upon the support such an impression seemed to derive from these particulars he desired to ask Mr. Ferrey whether the building at Christchurch, to which he had drawn attention, was built for a similar purpose.

Mr. **Ferrey** said that this circular building stood at the north-east corner of the transept, over the crypt. It was therefore not easy to imagine that it could have been designated as a baptistery in any sense. The date of it was known; it would be the latter end of the eleventh century.

Mr. **Beresford-Hope**, having seconded the vote of thanks to Mr. Ferrey.

The President said it had been remarked by that gentleman how interesting it was to seek out and ascertain the names of the architects of our cathedral churches. He felt how true was that observation, because it opened up other sources of enquiry of the highest interest, such as the *schools* from which were derived all the variety of sentiments and feelings which prevailed in the Mediæval monuments of this country. On going into our cathedrals it was evident that different types and characters and thought were prevalent in those edifices, distinguishing the one from the other. Similar types were found to prevail throughout the European continent. In Germany and France was discoverable the repetition of the same sentiments as in our own cathedrals. It would appear that Durham and Christchurch had been designed by the same architect; and there was to be traced in examples abroad two distinct developments of the Byzantine; for there were the German Byzantine, the French Byzantine, the Lombard Byzantine, as well as the English Byzantine. Durham reflected the Lombard Byzantine more than any other; as, for instance, in the square piers with the vaulting shafts, which formed the great divisions of the nave, and the heavy columns between those piers dividing the bay into two openings. They found the same style prevalent in the Church of St. Peter, at Northampton, with the same piers and vaulting shafts, and the intermediate columns, resembling the Byzantine of the Lombard type which was found in many of the churches of Lombardy, as, for instance, at St. Zeno, Verona. Another type was that of the French Byzantine, as in Caen, where the arches were in a continuous line of the same size. These implied two distinct principles; and Flambard must either have been himself inoculated with the feeling of the Lombard style, or else borrowed it from the architects of such buildings as Durham and Northampton. Then another type is traceable, as at Oxford and Romsey, which Mr. Ferrey believed both to have been designed by the same architecte His (the President's) own opinion was, that there was a connection between the religious establishments in this country and those abroad, so that when a fraternity in England contemplated the erection of some great or novel work, they would apply to their brethren abroad, who sent over an architect capable of doing it; or else, one from England was sent abroad to study the peculiar examples of that country. Referring to the inscription "*fecit*" on some of the works mentioned by Mr. Ferrey, it was noticeable that the classical artists never used the perfect tense, but always the imperfect, *i.e.*, "faciebat," as though the work were progressing, and not as completed; this was curious as a literary question. With regard to the late Mr. Cockerell's and Herr Henzleman's theories of the geometric law, which governed the proportions and forms of Mediæval architecture, he felt there must be some such existing; it had eluded their research hitherto; he, however, could not but think, that in building, as in other arts, there were geometrical combinations and proportions which, though undiscovered at present, might have served as a guide to the architects of those buildings. He had great pleasure in putting the resolution of the vote of thanks.

Mr. FERREY said that he hardly felt justified in at once accepting Mr. Papworth's proposition, and that he was not disposed to set aside records and documents which spoke freely and emphatically, merely because his friend thought it more desirable to insert the words "and builders," or "master masons." He saw no reason why the bishops of former days should not have been more gifted in the way of architectural knowledge than their brethren of the present day, and he had no doubt whatever the old bishops were the architects of those works which stand in their names.

The vote of thanks to Mr. Ferrey having been passed unanimously, the meeting adjourned.

ON SOME EXAMPLES OF MURAL PAINTING.

By the Rev. Edward L. Cutts.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, May 16th, 1864.

Traces of decorative painting frequently come to light when the whitewash is stripped off the walls of a church in the progress of restoration or repair; but usually they are only fragments; and it is rarely that we are able to discover the whole system of decoration throughout a church. When such a discovery occurs it is worth putting on record; and even when the design and arrangement merely of the decoration of any considerable portion of a church comes to light, it is desirable that it should be recorded.

My purpose is to lay before you two or three such discoveries which have come under my own observation, and which, I believe, are hitherto unpublished.

The first of these is the entire decoration of a little Early English church in a very simple style, both of architecture and of coloured decorations, viz., the desecrated church at Little Coggeshall, in Essex. This church is otherwise interesting to architects from the fact that its dressings are of moulded brick of the thirteenth century, the mass of the walls being of flint and rubble. I exhibit a photograph, which will show these peculiarities of its construction. The plan of the church is a simple parallelogram, without any constructive division between the nave and chancel. The elevations are as follow: the *east end*, three long lancets grouped under a containing arch, with a light (probably circular) over them in the point of the gable; *west end*, a similar triplet without any light over it; *north side*, four lancets; *south side*, three lancets and door, the two westernmost lancets shortened to leave room beneath for a group of three sedilia, a double piscina, and a trefoil-headed credence. There is a semicircular string course running under the windows; the angles of the window-splays have a bold roll; the wall-plate has two rolls with a hollow between.

The colouring of the interior is as follows. Below the string course the original plaster of the wall is left untouched; above the string it is painted in masonry pattern in double lines, one line dark and the other pale. This pattern runs round the angle moulding of the window-splays, and extends two or three inches on the face of the splays, and then is stopped by a double vertical line, and the rest of the splay has the masonry pattern continued in single lines only. The string is of an emerald green, glazed. The wall-plate has its two rolls also emerald green, with the hollow between them white. The spandrils of the east window are ornamented with a flowing foliage pattern of usual Early English character. At the back of the niche of the middle sedile are traces of a cruciform nimbus, which is enough to prove that it contained a representation of our Lord. Perhaps the two other sedilia had also figures. Fragments of a pavement have been found, sufficient to enable us to restore the whole design, which was a geometrical pattern of buff, green, and dark red, of which I exhibit a drawing.* It is perhaps of later date than the wall decoration. Part of the original roof remains over the east end, and the nave roof is probably made up of the original timbers, but no trace of painting can be detected upon them. If the roof was not originally touched with colour, we have before us the entire plan for the coloured decoration of this little church.

At Little Braxted church, in Essex, a recent restoration brought to light some indications of the coloured decoration of different periods. It is a little Norman church, with a rounded apse, with five small round-headed lights in the apse, and one in each side of the chancel. The original decoration was of masonry pattern in double lines, which appears to have been confined to the chancel. There are also two dedication crosses remaining, painted on the east wall, under the two windows on each side of the central light. A cross patée within a circular rim, the cross dark chocolate, the rim of a dirty grey colour, which is probably faded blue or green. I have met with other examples of dedication crosses of different dates, and they are all of about the same shape, and seem to have usually the same colours, red and green, introduced, *e.g.* at Wiston, Suffolk, and at Great Coggeshall, Essex.

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* This, together with a further description of the church is published in the Essex Archæological Transactions vol. iii., part 2, 1864.

This original colouring was washed over probably at the time that the present decorated east window took the place of the original round-headed light, and the walls of the chancel were diapered over with a flower in very dark red, of which I exhibit a drawing. This also seems to have been limited to the chancel walls. This again had been washed over in the sixteenth century, and texts painted in black letter, with red ornamental borders of Elizabethan or Jacobean character.

The next example is the large fine perpendicular church of Great Coggeshall, in Essex. During the restoration of this church, I looked carefully for all indications of its original coloured decoration, and think that its entire plan could be made out. The plan of the church is chancel and nave, and aisles running through from east to west, with tower and porch. Colour seems to have been very sparingly applied to the architecture. The walls generally seem to have been left unpainted, with only a line of red in the moulding round the edge of the window splays. The bell of the capitals of the pillars was red. The arches across the chancel and its aisles had a few stripes of plain colour in the mouldings—chocolate, bright red, and yellow. The east walls of the chancel aisles had been painted over with a tapestry pattern, common in the time of Henry VII., which pattern returned a short distance along the adjoining walls to form an enrichment about the chantry altars. There was, moreover, a whole series of dedication crosses upon the walls of the chancel aisles, like those already mentioned; the cross dark red, and the rim of dirty grey (probably faded green). There were two under the windows of the north wall of the north chancel aisle, and one beside the east window of that aisle, one under the east window of the south chancel aisle, and four others under windows in its south wall; and in the absence of other painting this series of crosses must have been conspicuous. It will be seen that there was very little painting indeed, and for that very reason I think it is worth noting, as a proof that in a fine large handsome church the system of decorative colour was sometimes of a very simple character. I presume the painted glass in the numerous and large windows afforded abundance of colour of the most brilliant kind, and it was desirable that the wall spaces between should be left plain, as a foil to the glass paintings, with only a line of colour here and there to give emphasis to the chief architectural features, and to carry the colour into the body of the building.

I should mention that there are traces of colour on the external mouldings of the south doorway and chancel doorway of this church, which indicate that the entrances to the church were then enriched. I have met with other evidences that colouring was applied to interior decoration.

These are examples of mere decorative painting of the simplest possible kind. I have now to submit to you some more elaborate examples. It is common enough to find remains of paintings of scriptural and legendary subjects on church walls, but most commonly they are isolated subjects, which give no clue to any general series or plan of arrangement; indeed, in many cases, unconnected pictures seem to have been painted on the walls, here and there, at the caprice of the painter, without any general plan or arrangement at all. I submit the following examples, because they do indicate a plan for the symmetrical arrangement of a series of pictures for the decoration of a church interior.

In the churchyard of St. Brelade, Jersey, there is a chapel of no architectural character but interesting as an example of the detached chapels which used sometimes to exist in our churchyards, and interesting for some remains of painting in the interior. The interior is a perfect plain unadorned parallelogram, roofed in with a perfectly plain pointed vault. On this vault are the traces of painting. Along the top is a line of foliage pattern. Each side of the vault is divided into three long lines of painting, the subjects following one another consecutively, as in the Bayeux tapestry. They are painted on the ground of white plaster, which is diapered with a pattern. On the north side, beginning at the west end, the subjects are Herod sitting in judgment on our Lord; on a scroll out of his mouth Herodes roy. His soldiers and men-at-arms indicate the date of the painting to be early in the fourteenth century. The next subject is the Binding of our Lord. The second row begins with the Scourging of our Lord; next, Bearing the Cross. The lower line of painting is now obliterated. On the south side, beginning at the west end, the subjects are as follows:—in the first portion is seen a kingly figure, but the rest of the subject is obliterated; the second picture is clearly an Annunciation. So it would seem as if the history of our Lord's Nativity formed the subject of the series on the south side, and his Passion the subject on the north. At the west end of the building is the subject of St. Michael weighing Souls. The painting is in red outlines, and of good execution.

This, then, suggests one mode of arranging a series of mural paintings in a church, especially when the paintings are consecutive scenes in the same history, viz., to put them in two or more lines along the upper or middle part of the wall, with borders between the lines; the wall-space above the paintings, if any is left, being diapered with some simple pattern, and finished with another border under the wall-plate.

In the restoration of Headington Church, Oxfordshire, no less than twenty-four coats of whitewash were counted on the wall, and if these could have been peeled off entire, they would have given us no less than six different series of wall paintings of different dates. The latest were of Tudor date, and nearly the whole scheme of decoration could be made out. There were bright red and white lines up the pillars; the nave arches had red chamfers; and an engrailed border, each point of the engrailing ending in rudely drawn trefoils, ran round the labels of the nave arches and round the margins of the window and door arches; all splays were crossed with diagonal stripes, with semi-circles and trefoils budding out at about every foot. There were some traces of red tapestry pattern on the south wall to the left of the door, and on other walls texts in black letter, with broad borders of red or of red stems with green leaves. On four other coats of whitewash were powderings of crosses, roses and knots. The original painting of thirteenth century date was the most elaborate and interesting, and again a great part of the entire scheme of colour could be made out. The nave arches were coloured red on the exterior chamfers and yellow on the interior, with a scroll pattern, like that on south wall, on the soffit; the angles of window splays and doors had a running pattern of yellow divided by pink mortar lines, with a centre line of white on the pink. The east end of the nave was entirely covered with painting: below was a pattern of hangings, like that on the north wall; above that the wall was powdered with red cinquefoils on the buff plaster, and divided by stripes of red. Immediately over the round Norman chancel arch was a painted arch of scroll pattern, upon the upper part of which was a picture of the Majesty, viz. a figure of our Lord under a canopy, with kneeling figures on each side. Part of the south wall is represented in the accompanying drawing. The lower part of the wall beneath the windows is covered with a pattern of hangings; the lower part of these hangings is destroyed, and the fringe which is added in the drawing is only conjectural, and is very possibly incorrect. The special feature for which I exhibit the drawing is the *arrangement* of the pictures. A masonry pattern is carried round the angle of the window splays, and the pictures are painted on the broad splays themselves, other pictures are added in the wall spaces with an irregular arrangement, *i. e.* they are not symmetrical with respect to the principal series, or to the wall spaces on which they are painted. The subjects of the paintings cannot all be made out satisfactorily; some of them seem to be incidents in the life of our Lord, but others, intermixed with these, appear to relate to other subjects; *e. g.* on the left jamb of the first window the subjects seem to be the Nativity and the Flight into Egypt, but those on the right jamb do not seem to belong to the same history, and are not intelligible; again, the two upper pictures on the right window seem to be the Slaughter of the Innocents and the Triumphal Entry into Jerusalem, but the lower pictures again do not seem to relate to the same story, and are unintelligible. The heads in the upper part of the splays are Saint Peter and Saint Paul in one window, and a Queen and a Bishop—probably two Saints—in the other.

The last example I have to submit to you is from Wiston Church, Suffolk. The Church is of Norman date; it has a chancel with apse, nave without aisles, three windows and a door on each side. In restoring the nave some years ago, remains of painting were found upon all the walls, and careful tracings were made, though the subjects were very imperfect; and I shall endeavour to describe their arrangement. On the north side there were two rows of paintings, one beneath the level of the window sills, another between the windows, a little space intervening between the two rows; scroll borders bounded both top and bottom of both rows of paintings. The border at the bottom of the upper row extends into the splay of the window, and the corner of splay cut off is powdered with blue cinquefoils; perhaps the series of paintings extended into the splay; the raising of the line of painting, so as to run continuously into the splay, seems an improvement on the method adopted at Headington. There was also a painting on the tympanum of the north door. Some of the lower line of these paintings are perhaps incidents in the history of John the Baptist: the first is undecipherable; the second is Herod amid his Lords, High Captains and Chief Estates of Galilee; the third is a sitting figure before a group, of whom the first wears an iron cap; the execution of John in prison is the last but one; and a fragment of John's head, with a head of an elderly female, probably Herodias receiving the Baptist's head, comes last. Only one of the upper row (that at the east end) is decipherable: a Franciscan friar enters into the subject. The picture in the tympanum is also traced, subject unknown. On the south wall is the more perfect and interesting series. Between the windows is painted an arcade of trefoiled arches, with a picture under each arch. Another row of pictures in square panels comes under the arcade, bordered by scrolls. The subjects of the upper series seem to be as follows, beginning at the east end:—

1. Annunciation.
(Window.)
2. Nativity.
3. Annunciation. Angel and Star.
4. Shepherds.
5. Adoration of the Magi.
6. Undecipherable.
(Window.)
7. Undecipherable.
8. The B.V.M. Over south door.
9. The Magi warned.
10. Female Figure with child.

Two or three others undecipherable.

The paintings of the lower row are much mutilated. There are lines of red in the mouldings of the chancel arch, and a scroll pattern. On the east wall, on the right-hand side of the chancel arch, is a painting of a saint holding a cross, in the same line as the arcade described above; but the wall above this picture is diapered with the pattern exhibited. On the west wall are two rows of paintings with borders, the two rows probably forming part of one subject, which is the Last Judgment; the judge in the middle, with groups on each side in the upper row, and in the lower row angels receiving the blessed, and fiends hurrying away the lost. The figures are executed for the most part in strong red outlines on the original ground of buff-coloured plaster, with occasionally a part of a dress or a piece of drapery entirely washed in with flat colour, only red and blue being introduced. The style of art is like and equal to that of good illuminated manuscripts of the period, which I take to be the former half of the fourteenth century.

By collecting together the fragments which are found scattered in various churches, no doubt we could make out many other entire schemes of Mediæval coloured decoration of various degrees of simplicity or elaboration. Perhaps every gentleman present has some examples in his note book, not of much use alone, but which might be made useful if brought into comparison with others similarly useless in themselves. May I be allowed to take the opportunity which you have given me in inviting me here to-night to say that if any gentlemen possessing such notes and sketches please to communicate them to me, I will promise to take pains to put them together and to endeavour to make them generally useful.

Mr. **George Edmund Street**, V. P., rose to express his grateful feelings to Mr. Cutts for h observations on this subject. He felt that the decoration of church walls was a matter of extreme importance; but the more he thought, the more he saw the difficulty of it: and having begun life with painting walls himself, he had come finally to the practice of not having any painting at all done, except by some one who could paint a great deal better than he was himself ever likely to do. He confessed he did not see his way to the restoration of the practice of painting church walls as it existed in this country in the middle ages; because, following their example, they must have figure subjects; and it must be confessed that the drawings which appeared to satisfy people 500 years ago, would not, at the present day, be put up with; and if they wanted a better class of painting the expense would be very large, though he hoped that here and there symptoms were seen that people were becoming alive to the fact that for the same money that they now pay for bad stained-glass decorations they might have something much more really good painted on their walls. At the beginning of last week he was looking at one of the most distinguished painters of the day engaged on some work he was executing in Lyndhurst church, Hants, and if he did not sympathise in every respect with the design of the work, it was undoubtedly one of great beauty and importance. This was the work of Mr. Leighton, and with such a painter he need not say that they had every assurance of the work being extremely well done. Now it was of importance that painters of eminence, like Mr. Leighton, who had not perhaps been able to give any great attention to the examples of old English mural paintings, should have some such guide book of what the old painters had done, as Mr. Cutts had expressed his intention of favouring them with. If a painter adopted a system of arcading or panelling for his subjects, the effect would generally be good; and it was not an uncommon arrangement in old examples. He had in his mind a church at East Wickham, in Kent, which once contained some very interesting paintings of the thirteenth century, arranged in two arcades, one above the other, all over the chancel walls. Almost every church in the country had been more or less painted, and a great many systems might be referred to. There was one cathedral, especially, to which he would like to call the attention of the Institute, which seemed to afford the most important example of mural painting in this country, viz., that of Salisbury. Any one who looked up to the groining of the choir there might see clear traces of the paintings, with which the vaults and walls were covered, shewing through the plaster; and he trusted it would be part of the object of Mr. Gilbert Scott, in his work there, to clean off the whitewash and preserve these interesting works of art; inasmuch, as from what could be already seen through the plaster, the work was evidently very finely painted. There are pieces of a great many figures, and the detail is of the same character apparently as the well-known paintings in the chapter-house. There was another important point raised by the consideration of such a paper: that was the way in which new wall paintings should be done. Headington church had been mentioned as having been painted six times in 300 years, which gave a duration of fifty years to each set of paintings; and now, perhaps, if paintings were done in distemper, the probability was, that after fifty years, wherever liable to injury, they would be so far injured that the next generation would be sure to paint them again. That would be disheartening to those who wanted something more than mere diapering, which was, to his mind, a poor kind of decoration for the walls of churches. This part of the subject was full of difficulty, and he had been always very much interested in the discussions which had taken place as to the best mode of getting wall paintings executed. The east wall of a church which he had himself built in Westminster had been painted in fresco by Mr. G. F. Watts, and unless he was much mistaken that was beginning to show signs of decay. Mr. Gambier Parry, an amateur to whom art was much indebted, had set to work to paint the church he had built at Highnam upon a new system of his own invention, and Mr. Leighton was following the same system at Lyndhurst, with such success that there was absolutely no difference in the work done two years ago and that which Mr. Leighton was now executing. He saturated the plaster with essential oil, and painted upon that, and kept soaking it with oil all the time he was painting. It was, therefore, entirely different from fresco; and in those parts of the building free from damp he thought it was likely to be more durable. Almost all the early paintings on walls in England and on the Continent were, he believed, in distemper. The early paintings in Italy were distemper, and not fresco, and afforded good evidence that distemper was durable when placed out of the reach of damp or damage by hand. Probably distemper painting would be much more commonly practised for the future, owing to the invention of water-glass, though some of those who were acquainted with it thought it would not answer as well as was imagined; and this, indeed seemed to be proved by the state of some of the pictures painted in that process in the church of St. Alban, Holborn. In conclusion, he had much pleasure in now proposing that the thanks of the meeting be given to Mr. Cutts for his interesting communication.

The Chairman, Ewan Christian, V.P., said the Norman and Early English architects used a very superior kind of plaster, which remained in many instances quite perfect to the present day. He had seen several paintings on that plaster 700 or 800 years old still in good preservation. A good example of it was to be found in the lower story of the buildings attached to the Abbey of Hambye, near Coutances, now used as cider cellars. There were many instances in which original paintings had been coated over with whitewash, and fresh paintings added in succeeding generations. That was the case in Little Braxted Church, in Essex; there were in that case three successive sets of paintings, but those on the Norman parts of the building remained almost perfect, notwithstanding the coatings of whitewash that had been applied in after ages. In these days the art of plastering walls as practised in the early periods of Gothic architecture seemed to be lost. The ancient plaster was a very superior kind of stucco, whether used externally or internally; and he believed it to be the constant practice of the early builders to plaster their walls, leaving them for Nature's painting outside, whilst decorating them by the art of man internally. He had seen, within the last year, some very good specimens of wall painting in a little Church at Sharncote, near Cirencester, where the early decoration on the east side of the chancel arch was as perfect as when it was first executed on the original plaster, and had fortunately never been covered over with whitewash. As regards external plaster, some thirteen or fourteen years ago Mr. Cutts asked him whether he thought rubble walls were not always intended by their builders to be plastered externally, there being at that time a great rage throughout the country for clearing off all the ancient stucco and pointing the stonework, and he believed it had been mistakenly done. Since that question had been put to him he had been a very careful observer in the matter, and had come to the conclusion that almost every rubble wall he had examined had been originally plastered between the dressings, both inside and out. As regards interiors, he believed it was intended that all churches should be decorated by painting, and he thought it was a practice that it was desirable to revive in the present day. It might be a question whether they could go to the extent of the beautiful decoration referred to by Mr. Street, but still much might be done to render the walls of churches less bare and ugly than they were generally left. He believed as a rule all the rubble walls of the country were plastered, and a great deal of plaster had been stripped off which would have been much better left on; and, as Mr. Cutts remarked, in the photograph taken from Little Coggeshall Church there was the trace of the original plaster on the exterior. And he would remark with respect to that church, that any gentleman who happened to be in the neighbourhood would be amply repaid for a visit to it. It was the most remarkable example of early brickwork he knew in the country; the very earliest example he had met with. With regard to painted decorations, Mr. Street had suggested that they were whitewashed over because they became dusty and faded. Now, he thought, if the fine plaster spoken of were used as a preparation for the painting, it would bear sweeping without injury to the painting, and believed the painting would last as long as the wall.

Mr. STREET thought nothing looked better, usually, than a rough stone wall. He had looked into this subject as carefully as any one could, and he had been met constantly, as he was sure their chairman must have been, with the difficulty of putting plaster upon old rough stone walls, because the rough stonework was almost always set in advance of the quoins and other wrought stonework. He thought it would be found difficult to apply the delicate plaster used on the Romanesque walls to walls of excessively rough materials, as the layer of fine plaster was not more than the eighth of an inch thick; and he thought that, when they found the rough stone-work of the walls project in front of the building, they might with certainty assume that they were not meant to be plastered. It seemed to him to be only a common-sense proceeding not to plaster a wall unless they intended to paint it. If the chairman recommended them to leave the walls unplastered till they could paint them, he (Mr. Street) agreed with him; but if he recommended the plastering of the walls at any rate, and that they should wait for some one to paint them, he could not agree with that advice.

Mr. WILLIAM WHITE, Fellow, remarked that there was, besides the distemper and fresco, quite a distinct mode of painting in old examples, the exact nature of which they did not know. Whether it was a description of the tempera, so often referred to in old works, he could not say, but he thought it would be found: it did not come off in the same kind of way that other modes of painting did when the various colour-washes were picked off the plaster. He had met with it in several instances, and in one case it had been apparently hacked to make a subsequent coat of thin plaster or colour-wash stick to the wall, preparatory to later distemper. There was the gable wall over the chancel arch in Beaminster church, Dorset, which appeared to have been done in that way. He was greatly disappointed, on his return a few weeks after he had first seen it, at finding that they had stuccoed it over instead of leaving it simply in its unrestored state; for there was a very superior tone of colouring about it, the general effect of which would have been quite passable, irrespective of the interest of the painting, although it was greatly damaged. He had often wished some one would take up that kind of work to see whether it could not be discovered what the mode of painting was. It had a brilliancy which tempera had not, and was more like fresco in effect, though it was not plastered into the lime as fresco was. He thought it might lead to the adoption of some similar process now which might prove superior to modern modes.

Professor Kerr, Fellow, remarked with respect to the composition of such fine plaster as had been referred to, that examination would probably show that it was made of carbonate of lime, wholly or in part, instead of sand. Instead of using a set coat made of lime alone (as at present the practice), this being a very weak and perishable material, if there were added a certain quantity of ground mason's dust, he believed this would form the superior plaster required.

Mr. Thomas Morris, Associate, said the ancient Italians pulverized marble for sand, as well as burnt it for lime, so that their stucco was homogeneous. This was the composition on which the early mural designs in the tomb of Caius Cestus, at Rome (illustrated by Piranesi), were presumed to be executed; and they remained tolerably fresh up to the present time. Since the works of the great masters were produced, failure in fresco appeared to be the almost invariable rule; and recent specimens were so touched up with tempera and other colours that their original character was seldom preserved. We had been lately indulging the most sanguine expectations from the employment of water-glass; but if the success of that process were also to be doubted, we seemed likely to be again thrown upon the open sea of uncertainty.

The vote of thanks to Mr. Cutts having been seconded by Mr. W. A. Boulnois, was passed unanimously.

AN ACCOUNT OF THE REPAIRS LATELY EFFECTED AT THE TEMPLE CHURCH, LONDON.

By J. P. St. Aubyn, Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, May 16th, 1864.

I believe the first attempt at restoration at the Temple Church was in 1825-27, when some buildings, which stood on the south side of the Round Church, and were incorporated with the Chapel of St. Ann, were removed, and the chapel destroyed to the level of the ground. It was then, I believe, that the rubble face of the south side of the Round Church was cut away, and the Bath-stone ashlar and a parapet substituted. Other repairs were also done at this time to the interior.

The second restoration, which was very extensive, comprised the whole of the church excepting the north side, or one-half of the exterior of the Round Church and a considerable part of the porch. You all know the extent of these repairs, and doubtless have heard of their cost.* The late, or third restoration, embraces only the repairs of the north side of the Round Church, the re-roofing of the clerestory, and the external repairs of the porch.

The few observations I have to address to you will be devoted to pointing out some of the peculiarities and features that have been brought to light during the progress of these last-mentioned works; in which Professor Sydney Smirke, R.A., acted as Architect to the Society of the Inner, and myself in the same capacity to that of the Middle Temple.

After frequent meetings and negociations between the members of the "two Temples," the Benchers agreed to adopt my suggestions and to remove the whole of the buildings standing on the east side of Inner Temple Lane, and to throw open the principal part of the space so cleared.

This done, the melancholy state of this part of the church was apparent. The soil had accumulated about six feet, and all sorts of disfigurements and mutilations were shown to have been committed on the building.

A heavy brick parapet surmounted the table course of the eaves, and within this was a lead gutter. The first operation, of course, was to excavate the ground to its original level, and so to ascertain the extent of the repairs necessary to be undertaken.

This was done. A photograph taken at the time shows the state of the walls tolerably well. The buttresses and their sets-off were much mutilated, and all the dressed work of fire, or Reigate, stone had quite perished; but the other stone-work, apparently of coarse oolite, had stood very well.

The north arch of the porch, the only one of the three not tampered with, was in a very shattered and almost falling condition; but, by great care, we were able to preserve it, as well as the north-west pier and the ancient groining which covered one-half of the porch.

The first point in the restoration was to decide as to the finish of the roof at the eaves. I had little doubt, from the result of investigation, that, when first designed, the roof had hanging or dripping eaves; a parapet, therefore, as adopted in 1825, on the south side, was, in my opinion, a mistake. A stone gutter was then proposed; but this was open to the same objection as the parapet, viz., that it was adding something on the walls, for which there was no existing authority. An iron or lead gutter, resting on the table course, was then suggested; and the result is the cast lead gutter which you now see.

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* Full notices of these are to be found in Addison's History of the Temple Church, 1842; Billing's Architectural Illustrations, 1838, and an Account of the Temple Church, by Sydney Smirke, F.S.A., in "Weale's Quarterly Papers," vol. ii., 1844, to which latter a variety of illustrations of decorations, woodwork of stalls, &c., is appended.

The buttress sets-off were the next difficulty. The eastern one is quite different in profile from the other two, and appears to have been re-built on the top of the plinth course of the original buttress, about the beginning of the last century. The two remaining buttresses had been much mutilated; but, by a very careful examination, stone by stone, of the overlaying parts, as they were removed, I think we can state with tolerable certainty that the original profile has been reproduced.

I should here mention that the front faces of these buttresses are not in a right line, but curved, and form parts of the arcs of circles, the centre of which coincides with the centre of the Round Church itself. This is necessary, in order that the buttress face may unite with the curve of the table course at the eaves.

The restoration of the remaining features of this portion of the work was comparatively easy; a bit here and a fragment in another place giving sufficient data whereby to complete the wanting parts. As I have said before, the Reigate stone, whether in ashlar or otherwise, was very much perished: this we have replaced with Bath stone. The nook shafts, which had all disappeared, have been replaced with red Mansfield stone. The caps of these shafts are curious, and very similar to those of the arcades running round the inside of the Round Church under the windows. The bases are uncommon in form, the profile being very flat. The walling is of rough Kentish rag stone, in irregular or random courses. This has been made good, as nearly as possible to harmonize with the old work; and, although abundant proof remains to show that the whole external face of this walling was covered with a thin coat of plaster, filling in the hollows and just covering the surface of the rough stone, still we have not been bold enough to re-adopt this mode of finishing the surface of the walls; but the pointing, which has been substituted for it, will not prevent the more ancient mode of finish, should it at any time be considered desirable to revert to it.

On the walls are tracings of the mason's marks found on the outer surface of some of the stones.

I need hardly mention that the ashlar was all shaped and worked with the stone-axe. This mode of dressing we have adopted in all the new work, and the modern "drag" has not been used.

I now come to the porch, the date of which, as far as I know, has not been ascertained: it is certainly later than the round church of 1185. This is clearly ascertained by the existence of the foundations of what would be the two western radiating buttresses, and by the top course of each of these buttresses still remaining under the eaves-course. . A further proof also occurs in the breaking off of the plinth; that of the porch being quite different from that of the round church, against which it abuts. I venture to think it occupies a date between that of the round and of the square church; and I am inclined to agree with what is conjectured by Britton in his account, given in his Architectural Antiquities, viz.: "That the exterior walls of the round church, with the great western door, are the remains of the original building of 1185, but the six clustered shafts within, with the superincumbent arches, are of later date." Now, I think it may be safely asserted that even this part of the church is earlier than the square church, from which it differs in detail, as well as in the shape of the arches; and I conclude that the porch and the arcade of the round church are of one and the same date. I propose, therefore, as I have said, to place the porch between 1185 (the known date of a part, at least, of the round church) and 1240, the date of the square church; but very soon after the earlier period. This opinion might be subject to confirmation or otherwise if the outer wall could be stripped; but I have not had an opportunity of verifying my theory by this test.

The wheel window could not have been part of the original design of the west front; and, the ornaments on this so closely resemble those of the capitals of the porch, and the caps to both are so nearly alike in form and character, that I assign the insertion of the window to the same date as the porch. Great care appears to have been taken to keep down the roof of the porch so as not to obscure the light to the window. The stone vaulting is for this purpose finished in a very peculiar way; the outer face or back of the vaulting did not follow the same curve as the under face, but was straight; that is, the back is formed sloping, like a roof, and on this was laid the boarding (to carry a lead roof), as evidenced by the impress of the boards still remaining on the mortar. By this means the roof was kept very low, and it does not obstruct the light to the window.

The drawing shows the state of the north arch of the porch. Sufficient was found to indicate very nearly the exact form of this front; the dip of the string is peculiar, and, I fancy, gives an apparent height to the gable, which it wants. I am sorry, therefore, I was not allowed to repeat the same arrangement on the other side. The parapet is conjectural, although there is evidence to show that one did exist.

The base of the porch buttress was found to exist as high as the top of the plinth. So far the restoration of the buttresses is complete: but as to the sets off and their height we have nothing to guide us. The bases and caps are peculiar in design. Observe the folds in the one, and the extreme flatness of the other. The wheel window is curious and beautiful; observe the cusps, caps, and bases; and the mode of fitting the work together, with a wedge piece between each voussoir. On each stone of the enclosing circle a centre line was scratched, which would show, I think, that the shape of each stone was drawn on the flat and then cut to the lines, instead of using a templet or mould, as is the modern practice.

This part of the church being finished, it was determined to remove the parapet on the clerestory, or upper Round, and to substitute a lead gutter, as on the aisle, and to roof it with a steep cone, at an angle of sixty-five degrees, rising to a total height of 105 feet from the ground to the top of the lead knop; the iron work, with cock, is 11 feet more. Inner Temple Lane now presents a far different aspect than when enclosed by high buildings on each side. A desirable object still remains to be accomplished, viz., the lowering of the surface of the lane by a somewhat sharper descent, thereby freeing the porch on its west side, as its present buried look detracts much from its appearance.

When the accumulated soil was removed, the stone coffins, which you see in the photograph and also on the plan, were discovered; but, I am sorry to say, in a very mutilated state. Very few were at all perfect, and all had been opened and filled up with rubbish and human bones. The coffins have been patched merely to keep them together, no attempt having been made to amalgamate the "repairs" with the ancient work; and, upon consideration, it was thought better to allow them to remain on the surface of the ground at the levels at which they were found, and where they may be now seen. The bones and rubbish in the coffins have not been examined. There are fragments of inscriptions on two of the lids, one quite unintelligible, the other, thus—

T. PꜧILIPPVS
ꜧILĀRIO

which Mr. Walford, who writes in the Archæological Journal (No. 78, 1863) supposes to be

+ HIC IACET PꜧILIPPVS DE SANCTO ꜧILARIO.

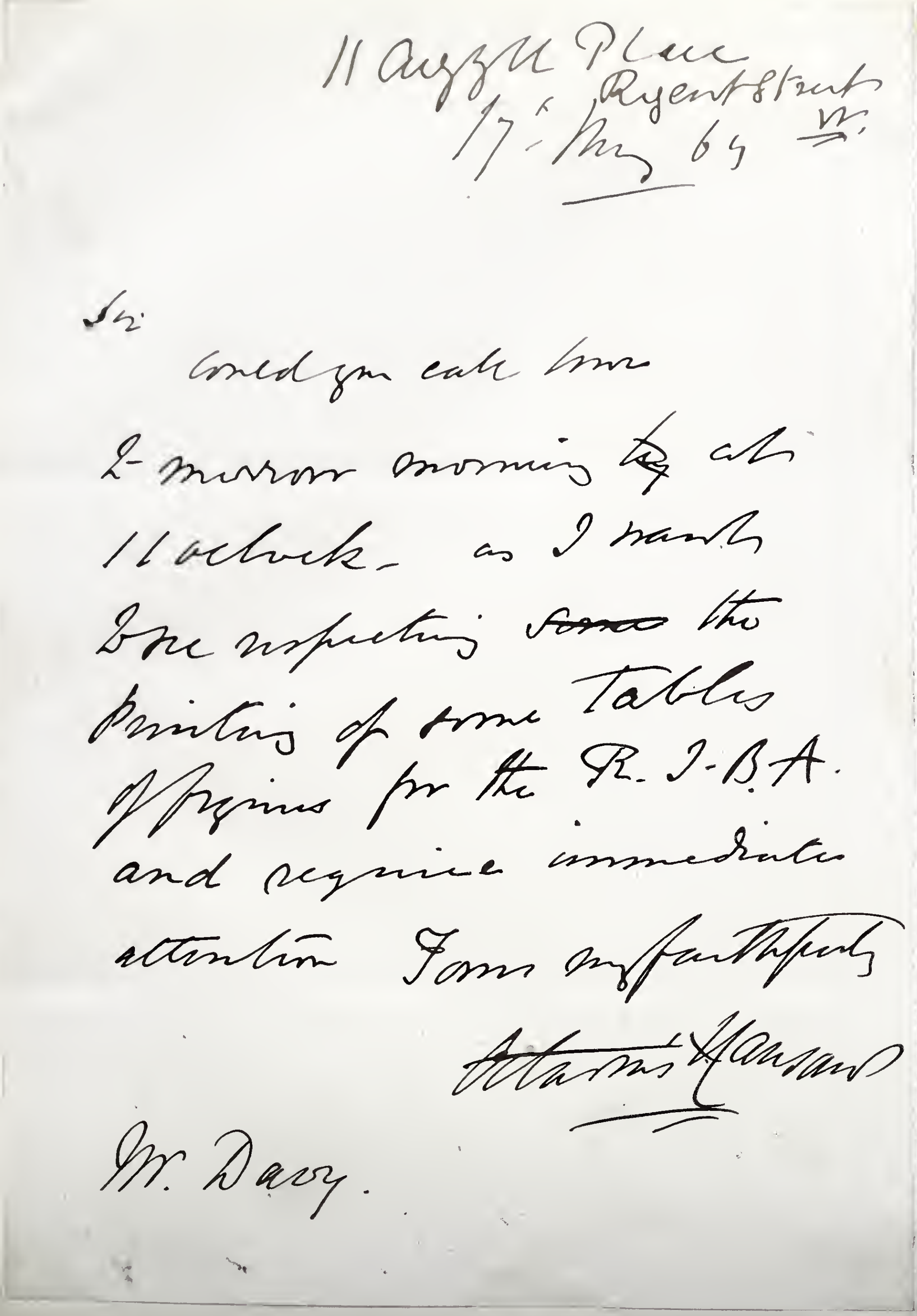
The ground around the church abounds in fragments of bones; but no whole skeletons were found, excepting two discovered in digging the foundations of Goldsmith's Building. These were without coffins, and nothing of interest was found with them: doubtless all the graves were well ransacked when the cemetery was turned into building ground.

It now only remains for me to mention St. Ann's chapel, which stood on the south side of the Round Church. A ground plan of this building is shown in all the earlier plans of the Temple church; and its outline is given in a plan made by Mr. Hakewill, in 1825, when unfortunately it was destroyed. The only elevation I have seen is from a drawing in the British Museum, copied into "The Builder," March 20th, vol. 20, 1862. As I have said, the whole of the shops on the south side of the church were destroyed in 1825, and with them all traces of the chapel and its crypt above ground. However, in cutting a drain for Goldsmith's Building, we came across the remains of the crypt, from which the rubbish has been cleared, and the remains covered with stone landings, with an opening at one end, so that it can be entered and viewed at any time. A few fragments of the vaulting ribs and other stones were found, as well as a few encaustic tiles. The drawings shew the south wall of the crypt as far as it remains, with the plastering, which is of very fine material, jointed with red lines.

MR. W. A. BOULNOIS inquired whether the timbers of the new roof were of oak.

The Chairman, EWAN CHRISTIAN, V.P., said that had not been stated by Mr. St. Aubyn. He added, he was sorry Mr. Street had not waited to hear the confirmation given in this paper to his (the Chairman's) observations about plastering walls. With respect to the Temple Church they must all admit that the form of roof introduced was an improvement, and he was glad to find that Mr. St. Aubyn had restored the lead gutters. Ancient examples of these gutters were now getting rare: but there were a few beautiful ones still remaining in the country—one on the choir of Lincoln Cathedral. It was, however, disappearing by degrees, and every time he went he feared to see another piece gone. It was a beautiful parapet, in cast lead, ornamented with enriched panelling. There had been similar gutters at Canterbury Cathedral, but little now remained. Last year at a village church in Dorsetshire he saw a very simple and beautiful lead eaves gutter such as he thought might be more generally introduced, instead of the cast iron gutters which required frequent painting, and soon got out of order. He was sure the meeting would be unanimous in agreeing to a vote of thanks to Mr. St. Aubyn for his paper.

The vote of thanks was passed by acclamation, after which the meeting adjourned.



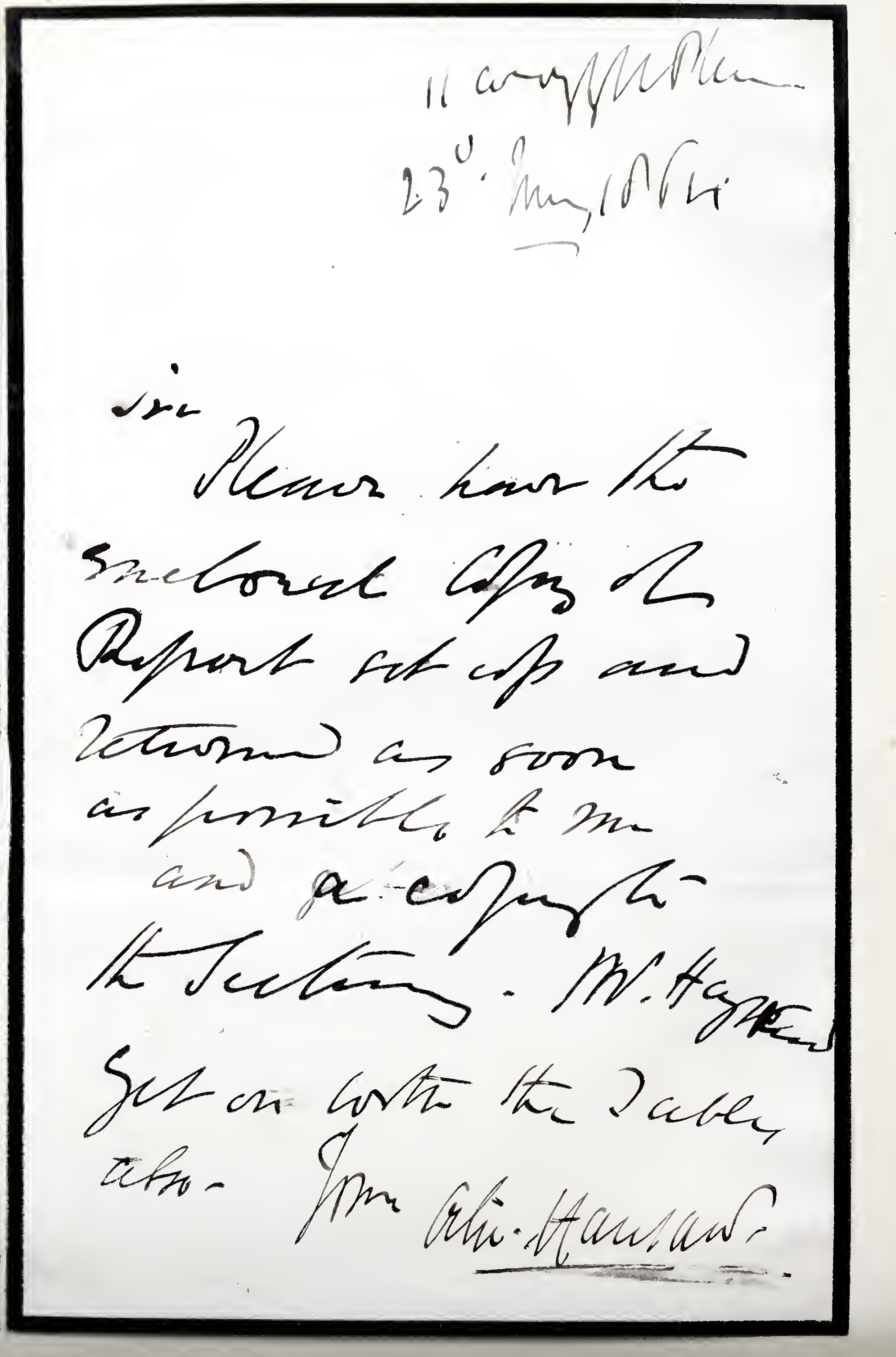
11 Argyll Place
Regent Street
W.
17th Aug 64

Sir

Could you call here to-morrow morning ~~by~~ at 11 o'clock — as I want to see you respecting ~~some~~ the printing of some Tables of Figures for the R.I.B.A. and require immediate attention. Yours very faithfully

Hansard

Mr. Davy.



11 Argyll Place
23rd Aug 1864

Sir

Please have the enclosed Copy of Report set up and returned as soon as possible to me and a proof of the Sections. Mr. Hayward get on with the Tables also. Yrs Hansard

Royal Institute of British Architects.

REPORT of the Committee appointed by the Council of the Royal Institute of British Architects, 2nd March, 1863, *for the Purpose of making experiments on Artificial Stone.*

YOUR Committee met on the 11th of March, 1863, and at once issued notices, and advertised in the public journals, that it was desirous of receiving prospectuses or other information connected with the manufacture of Artificial Stone; and resolved—

That each patentee be informed that this Committee proposes to report merely on the actual facts which may appear in the investigation;

That, so far as possible, the various materials used in the investigations be supplied under the immediate supervision of this Committee;

That Mr. C. H. Smith, Honorary Member, be added to this Committee;

That some eminent Chemist be associated with this Committee, in order to assist it in the investigation of the processes [Alfred White, Esq., was thereon added]; and

That each patentee be requested to inform this Committee the proceedings he would propose to adopt with regard to the investigation of his process.

It received responses from Messrs. Coignet, Ransome, Bodmer,* and Wheeble.†

Mr. Charles M. Westmacott put forward his patent cement and plaster; and although they are, perhaps, beyond the scope of the Committee, it was received by them, on account of the interest that had been shown in the patent at the meeting of the Institute on the 23rd of February, 1863.

The Committee met eleven times at Mr. Dines's, Grosvenor Road, twice at Mr. Tracey's, and once at Mr. Ransome's, in Cannon Row, exclusive of a visit to his works at Ipswich on the 15th of December last.

On the first meeting, at Mr. Dines's, the Committee met Mons. Coignet for two successive days (7th and 8th of April, 1863), who prepared before it various blocks of his patent béton, which were experimented upon at future meetings (Table A). The Committee, having had regard to the state of the materials after exposure to atmospheric influences, and the reverse, the results in these as in all its other experiments, may be taken as certified by the extreme care that it has taken, and are herewith appended in tabular forms, A, B, C, D, E, and F.

The Committee met in Cannon Row on the 15th of May, 1863, and Mr. Ransome thoroughly explained, in the most open and satisfactory manner, his process; but, as he stated that he could not, on so small a scale of manufacture, and without machinery, provide fair samples, it permitted him to prepare (from moulds supplied) samples at his works at Ipswich, and to forward them to London, guaranteed by him, to be experimented upon before it. The Commitee, however, not being satisfied with the results, thought it advisable to see samples made, and intimated its wish to Mr. Ransome, who most liberally received it at Ipswich on the 15th of December last, and exhibited his mode of manufacture on a large scale. Specimens from the moulds, supplied by the Committee, were made before it, which were tested afterwards in London; and subsequently he likewise prepared others from the same moulds, which were tested in like manner. The results are appended in Table B.

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* Patent Stone Bricks.

† Reading Abbey Stone.

The Committee deemed it advisable, for the better understanding of these results, to institute experiments upon other materials, as a means of comparison, the results of which are appended in Tables D, E, and F; and it would particularly direct your attention to Table D, showing a series of experiments, suggested by Mr. John W. Papworth, on cubes of Portland stone, 2″, 4″, and 6″ in height, by their respective beds, cut from a carefully-selected block 2′,0″ cube. The deductions to be drawn from this table appear to be, that the results obtained from crushing small cubes of 2″ and under on the side, as usually given in accepted tables, must be received with considerable caution, inasmuch as, while a 2″ Prisms 2″ + 2″ bore 1·5 of a ton put on the square inch, and 2″ Prisms 4″×4″, and 2″ Prisms 6″×6″, nearly 2·5 tons, yet 6″ Prisms 6″×6″, and 4″ Prisms 4″×4″, only bore 1·9 of a ton on the square inch, showing that the strength certainly increased with the size of the area, but apparently not in any definite proportion; while it was observed in these experiments that the height had considerable influence upon the ultimate resistance, a result not expected in contradiction of the usual neglect of the height until that element exceeds six times the diameter.

From Table F it appears that the cohesive power of cements may be classed in the following order: Martin's, Portland, and Roman; but it must be borne in mind that none of these had been exposed to atmospheric influences; yet the very remarkable differences, without any appreciable cause, in the results of the various experiments, shows that the strength of cements is a subject upon which no satisfactory theory has yet been definitely propounded.

The Committee trusts that the time required for preparing and testing, at given intervals, so many and various materials, will be sufficient reason for not laying the Report earlier before you; and it will be seen, from the extreme variation in the results given by the experiments, that the Committee is justified in repeating the experience of all zealous investigators; viz. that, without regard to the well-known inapplicability of general formulas to particular works, the Council must not be surprised at finding that the Committee will not draw peremptory deductions from even the experiments made, considering that the least number, to arrive at anything like a perfect conclusion, should be more than twenty of each size of every material: the Committee felt that it had no right to exact so much time and expense as thereby would be required from the professional gentlemen of your Committee, or from Mr. Dines, who personally superintended the details of each experiment; and, moreover, it had no funds placed in its hands by the Council for that purpose.

The Committee feels anxious to express its sense of the liberal and zealous manner in which Mr. Dines put the resources of his establishment, and his own time, at its disposal, furnished the samples and materials from which most of these experiments were made, and suggested the form which it believes to be quite novel of moulds for those to prove by tensile strength the cohesive power. (*See* Table F). The Committee otherwise could not possibly have carried out the experiments to the extent which, however incomplete, has furnished, it believes, as far as they go, a very trustworthy parallel of the strength of materials, deduced from specimens of a larger size—viz., 4″ cubes—than has generally been adopted. The Committee requests the Council to propose to the Institute a special vote of thanks to Mr. Dines.

The Committee, feeling that a fair investigation of the results given in the Tables herewith submitted would require much time and labour in the deduction of the main inferences to be drawn therefrom, as regards the object for which the Committee was appointed, have not hesitated to take so much trouble as to enable it to submit to the Council in a few short sentences the opinions formed upon the processes submitted.

Mons. COIGNET's process is admitted to be highly successful on a large scale in Paris; but the majority of the cubes prepared by him do not appear to be much stronger under pressure than ordinary concrete, and inferior to Bath stone, although they improve by age (*see* Table B.); and this weakness is impugned by him as a result on the ground that the samples were made out of his factory, and that he had not all the appliances requisite at command. A step, landing, and bas-relief made, in April, 1863, from the sweepings of refuse used for making blocks for experiments, are still at Mr. Dines's, and having been exposed to the weather, as well as to wear and tear, appear to stand as well as Portland cement.

Mr. Ransome's process appears to be founded on scientific principles, and, theoretically, ought to answer. The Committee finding that there must be some difficulty in ensuring the complete combination of the ingredients and reporting that few of the specimens especially prepared for it were thoroughly successful in that respect, and, similarly, but few of those made in its presence. (*See* Table B). There is an important difference between these and Mons. Coignet's examples, that Mr. Ransome is not able to declare that his process is highly successful on a large scale, but represents that he has not yet completed the appliances to put it into operation. In some of his specimens there appears an improvement as they advance in age; but so irregular is this that no reliance can be placed upon that feature. But it would seem that if the process of penetration is complete the ultimate strength is attained in a short period, and that the external influences of weather had little effect upon them in that respect. The Committee feels that if Mr. Ransome can ensure the perfection of his entire process, restrict himself to the production of work for each occasion as it may arise, and (for the sake of artistic excellence) avoid becoming a manufacturer of casts from a certain number of moulds, it is possible that for external decorative purposes there is a large field open to him; but they are of opinion that, as yet, Mr. Ransome has not rendered his material suitable for the chisel of the carver or the tool of the modeller.

Mr. Wheeble (Reading Abbey Concrete Stone) sent moulded bricks, made at Reading, from the works to the Committee, and they seem to have an ultimate strength, apparently produced by the use of stone lime, from Bridgewater, equal to that of common stocks; the latter, however, possess the advantage of not yielding until the instant of disintegration. The 4″ cubes made in moulds supplied by the Committee, and in its presence, never attained the strength of concrete except in a case where large gravel or flint was the chief ingredient (*see* Table C).

Messrs. Bodmer (Patent Compressed Stone Bricks) expressed their inability to comply with the requisitions of the Committee as to 4″ cubes, as the moulds of their press were of ordinary brick size; and if their material were pressed by manual labour into 4″ cube moulds it would not represent the artificial stone which they were in the habit of producing. The Committee accepted accordingly bricks supplied from their works, which show a steady progressive increase in strength as they advance in age; and the results justify the statement made by Messrs. Bodmer, that after six weeks to two months the bricks are fit for use (*see* Table C).

The Committee regrets the unfortunate inability of Mr. Charles Westmacott to put himself satisfactorily in connection with persons having at their disposal the premises and materials which he required for the display of the qualities of his processes. These chiefly depend upon the mixture of natural materials before adding water. The Committee has been able, however, to test one or two experiments, which result in giving it a favourable opinion of the system adopted by him, both for ceilings and for composition applied internally or externally. These may still be seen in Mr. Dines's yard, having been exposed through last autumn and winter. The quick stucco, for rendering ceilings, was tried in the month of May, 1863, consisting of unslacked lime, chalk, and sand, mixed pure, before adding water; it occupied in mixing and setting twenty minutes, was followed within an hour by ordinary guaged stuff, and stood without cracking. Messrs. Francis, of Nine Elms, have recently made arrangements with Mr. Westmacott to apply his processes practically; from their operations on a more extended scale than was possible to be carried on before the Committee, the valuable character of his invention may be more decidedly proved.

Had the results of the experiments now laid before you been more consistent with each other, and had they resulted in conclusions highly favourable to the various processes, the Committee would still have felt bound to impress upon the members of the Profession who have the opportunity of trying novelties, that future experiments for testing the strength of materials should be made on cubes of larger dimensions than have been heretofore employed; and they would suggest that cubes of 6″ sides would perhaps be the simplest and best adapted for the purpose: with regard to time, years instead of months are necessary to enable any one to arrive at practical conclusions as to the durability of any artificial material put forth in lieu of natural ones.

Members of the Institute who wish for any further information on the subject of the details of the processes, and manner of investigation adopted by the Committee, are requested to consider the minutes of its proceedings as an appendix to this report.

The Committee wish to express their best thanks to Messrs. Alfred White and George R. Burnell for their ready willingness at all times to assist and co-operate with them; and would suggest to the Council that the thanks of the Institute should be given to these gentlemen for their valuable services rendered.

(Signed) A. ASHPITEL, Fellow.
T. HAYTER LEWIS, Fellow.
JOHN W. PAPWORTH, Fellow.
ALFRED WHITE,
CHARLES H. SMITH, Hon. Member.

JOHN P. SEDDON, Fellow, } *Hon. Secs.*
CHARLES FORSTER HAYWARD, Fellow, } *Hon. Secs.*

OCTAVIUS HANSARD, Fellow, Hon. Sec. to the Committee.

23rd May, 1864.

APPENDIX TO THE REPORT OF THE COMMITTEE FOR THE PURPOSE OF MAKING EXPERIMENTS ON ARTIFICIAL STONE.

TABLE A.

Table shewing the strength under pressure at different ages of MONS. COIGNET'S *Patent Stone.*

All 4″ Cubes. Material supplied and made before the Committee.

Mark.	Composition.	4 Weeks.		8 Weeks.		12 Weeks.		16 Weeks.		46 Weeks.		56 Weeks.		Remarks.
		Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	All made in April 1863.
1	Coarse Sand - - 4 Grey Stone Lime - 1 Water 8 per cent.	..	… *a*	…	… *a*	…	… *a*	…	… *a*	…	…	…	…	*a* All broke into powder at the slightest pressure, and were tried bedded in leather and plaster.
2	Fine Sand - - - 4 Grey Stone Lime - 1 Water 8 per cent.	…	… *a*	…	·56 *a*	…	… *a*	…	…	…	…	…	…	
3	Coarse Sand - - 4 Grey Stone Lime - 1 Portland Cement 0·75 Water 10 per cent.	…	…	2·95	5·0	5·45 2· 0	6·75 5·85 *c*	4·2	4·6 *b*	5·0	5·4 *c*	1·0	3·25 *c*	*b* About 1½″ in centre rubbish, broke into 4 cones. *c* Exposed to atmospheric influences from time of make.
4	Fine Sand - - - 4 Grey Stone Lime - 1 Portland Cement 0·75 Water 10 per cent.	…	…	1·50	1·80	…	…	1·50 3· 3	3· 8 *d* 7·15 *e* *c*	…	…	…	…	*d* Crushed into powder. *e* Ground surfaces not bedded.
5	Coarse Sand - - 4 Blue Lias Lime - 1 Water 8 per cent.	…	… *a*	…	… *a*	…	… *a*	…	… *a*	…	…	…	…	
6	Fine Sand - - - 4 Blue Lias Lime - 1 Portland Cement 0·75 Water 10 per cent.	…	3·8	1·0	3·90 *c*	…	…	2·8	4·5	3·6	8·0 *c*	…	…	
7	Fine Sand - - - 4 Blue Lias Lime - 1 Water 8 per cent.	…	…	…	… *a*	…	… *a*	…	… *a*	…	… *e*	…	…	
8	Coarse Sand - - 4 Blue Lias Lime - 1 Portland Cement 0·75 Water 10 per cent.	3·4	3·8 *c*	4·0	5·90 *c*	3·6	7·7 *c*	2·2	8·2 *c*	…	…	…	…	

TABLE SHEWING TENSILE STRENGTH.

16 to 1 on sq. inch.

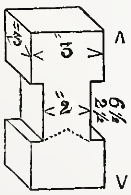
	Composition.	36 Weeks old.		Form.	Remarks.
		Breaking Weight. lbs.	lbs. on sq. inch.	Sketch shewing  form of fracture in each case.	All exposed to influences of weather since made. All broke whilst putting on 2 to 4 lbs. extra.
3	Same as above - -	656	41		
6	Ditto - - -	544	34		
8	Ditto - - -	1168	73		
4,5 & 7	Ditto - - -	448	28		

Table B.

Table shewing the strength under pressure at different ages of Mr. Ransome's *Patent Stone.*

All 4″ Cubes.—*Made at* Ipswich, in Moulds supplied by the Committee.

Mark.	Composition.	3 Days.		10 Days.		3 Weeks.		4 Weeks.		8 Weeks.		28 Weeks.		36 Weeks.		Remarks.
		Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	All made in April 1863
31	Sand - - - 4 Coarse Ballast 4 Clay - - - 1	...	9·35 *c*	14·0 4·0	15·25 5·60*c*	...	...	...	...	...	...	...	16·0 *c*	...		*a* split horizontally and perpendicularly.
38	Sand - - - 6 Chalk - - 1	5·0 ...	6·05 ... *c*	7·10 8· 0	9·40*c* 13·25*c*	...	...	5·0	5·55	6·8 *a*	8·4 *c*	...	14·0 *c*	7·0	8·4 *b*	*b* indurated from 1″ to 3″
48	Sand - - - 5 Chalk - - 1	4·0	8·90 *c*	...	. .	...	...	4·15	8·6 *c*	3·9	*b* 6·3 *c*	...	14·0*c* 14·0*c*	2·4	2·9 *d*	*d* bore without the least effect previously tested by Mr. R. at 20 Tons.
10	Sand - - - 5 Fine Silex - 1	...	...	...	...	...	30·0 *d*	...	...	...	...	...	35·0 *c*			
58	All road scrapings from neighbourhood of Ipswich	...	28·0 *c*													*c* all exposed to atmospheric influences from time of make.

4″ Cubes. *Made before* the Committee at Ipswich, Dec. 15, 1863.

Mark.	Composition.	10 Weeks.		15 Weeks.		17 Weeks.		Remarks.
		Cracked Tons.	Crushed. Tons.	Cracked. Tons.	Crushed Tons.	Cracken. Tons	Crushed. Tons.	
38	Same as above -	2·4 ...	7·0 *f* ...	... ...	6·75 *h* ... *k*	3·5 5·5	6·75 *h* 8·75 *h*	*f* exposed through hard frost, indurated from 1″ to 3″.
48	Same as above -	5·8 ...	7·4 *f* ...	4·0 ...	6· 2 *h* ...	4·0 4·0	8· 0 *h* 8· 0 *h*	*g* exposed from Dec. 30, to Feb. 23, not indurated, and very wet.
31	Same as above -	... ...	... ...	... ...	... ...	6· 0 4·30 8· 0	6· 0 *h* 5· 5 *g* 8· 0 *h*	*h* none thoroughly indurated, not exposed.
10	Same as above -	... ...	... ...	14·8	16·1 *h*	·50 3· 0 4· 0	4· 5 *g* 4· 5 *h* 9· 5 *h*	*i* apparently all sand, only indurated on surface.
34*	... ...	...	...	1·0	... *h* *i*	...	...	* composition not given.

Note.—Mr. Ransome states that, with respect to the examples made on this day, he misunderstood the wish of the Committee, and prepared them solely to show his process, and for exposure to atmospheric influences, and not to be tested by crushing.

9″ Brick. *Made before* the Committee.

Mark.	Composition.	13 Weeks.		
R.I.B.A. A.	Sand Ballast - 4 Fine Sand - 4 Chalk - - - 1	14·0	35·0	Never exposed to atmospheric influences and never washed.

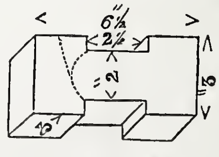
9″ Brick. *Made at* Ipswich.

Mark.	8 Weeks.		
38	6· 0	6·65*	* Induration not completed. All exposed to atmospheric influences.
″	20·15	38· 8	
48	4· 2	30· 0	

TABLE SHEWING TENSILE STRENGTH.

Made at Ipswich.

Mark.	Composition.	3 Days old.		28 Weeks old.		Remarks and Form.
		Breaking Weight in lbs.	on sq. inch lbs.	Breaking Weight in lbs.	on sq. inch lbs.	All exposed to atmospheric influences from time of make.
38	As above - - -	......	......	752 1184	47 74	
48	As above - - -	... ..	......	1104	67	
58	As above - - -	1616 1552	101 97	....	....	



Sketch shewing form of fracture in each case.

Pipes 18″ long 12″ diameter external, 1½″ thick, broke with 80 lbs. and 100 lbs. on the square inch—same composition as 48.

In all cases the composition was mixed with the Soluble Silicate of Soda in proportions of one gallon of Silicate to one bushel of sand, and saturated with a solution of Chloride of Calcium and afterwards washed in water, except sample R.I.B.A. A.

Table B.—*continued.*

Comparative Table of Messrs. Coignet's & Ransome's *with other Materials under Pressure.*

4″ Cubes.

	Mark.	4 Weeks.		8 Weeks.		16 Weeks.		28 Weeks.		36 Weeks.		46 Weeks.	
		Crushed. Tons.	Tons. on sq. in.	Crushed. Tons.	Tons. on sq. in.	Crushed. Tons.	Tons. on sq. in.	Crushed. Tons.	Tons. on sq. in.	Crushed. Tons.	Tons. on sq. in.	Crushed. Tons.	Tons. on sq. in.
Coignet Composition. See Table A.	3	...	...	5·0	·31	4·6	·28	...	...	...	...	5·4	·33
	6	3·8	·23	3·90	·24	4·5	·28	...	...	...	...	8.0	·5
	8	3·8	·23	5·90	·37	8·2	·51	...	...	...	...	...	...
Ransome Composition. See Table .B	38	5·55	·34	8·4	·52	8·75	·54	14·0	·87	8·4	·52	...	...
	48	8·6	·53	6·3	·39	8·0	·5	14·0	·87	2·9	·18	...	...

Materials.	3 Weeks.		Remarks.
Portland Stone Bas Bed	22·2	1·4	average of 7 examples.
Caen	14·0	·87	
Bath (Corsham)	8·41	·52	
„ (Box)	6·05	·37	
Concrete—1 Slack Lime 3 Ballast	5·2	·32	3 weeks old.

Table C.

Table shewing the strength under pressure at different ages of Wheeble's *Patent Concrete Stone (Reading Abbey).*

4″ Cubes. Materials *made before* the Committee in Moulds supplied.

Composition.	3 Weeks.		8 Weeks.		16 Weeks.		36 Weeks.		Remarks.
	Cracked. Tons.	Crushed. Tons.	Cracked. Tons.	Crushed. Tons.	Cracked. Tons.	Crushed. Tons.	Cracked. Tons.	Crushed. Tons.	
Coarse Gravel Hydraulic Lime (Bridgwater.)	1·6 1·8	2·0 *a* 2·1 *a*	3·7	12·3 *b*	...	...	1·7	3·5 *c*	*a a* Fell to pieces, no large stones. *b* A quantity of large stones. *c* After exposure to atmospheric influences from August 1863, to February 1864.
9′ Bricks.									
Same as above	...	...	6·75	20·5 *d*	5·30	14·75 *d*	...	...	*d* A large proportion of stones, which resisted crushing, really destroyed at point of cracking.
9″ Bricks.	Made at Reading.								
Same as above	2·8 8·0	12·5 *d* 26·0 *d*	... ...	... ...	... ...	... ...	... ...	... ...	*d* ditto

Table shewing the strength under pressure at different ages of Bodmer's *Patent Compressed Stone Bricks.*

9″ Bricks. *Supplied* to the Committee.

Composition.	4 Days.		11 Days.		18 Weeks.		22 Weeks.		63 Weeks.		Remarks.
	Cracked. Tons.	Crushed. Tons.	Cracked. Tons.	Crushed. Tons.	Cracked. Tons.	Crushed. Tons.	Cracked. Tons.	Crushed. Tons.	Cracked. Tons.	Crushed. Tons.	
Silicious Sand 7 Hydraulic Lime 1	under a	Ton	1·4	3·77	2·4	3·9	2·0 2·3	5·4 6·95	7·8	20·0 *m*	*m.* The ram at this point being leaky the reading is doubtful.

TABLE D.

Table shewing the results under pressure of Cubes 2″ 4″ and 6″ in height, by their Base.

Portland Stone.

(*Brown bed*).

HEIGHT.	Base.	Cracked.	Crushed.	on sq. inch.	REMARKS.
	″ ″	Tons.	Tons.	Tons.	
2″	2 × 2	...	3·2	0·8	At once.
”	2 × 2	4·0	6·0	1·5	
”	4 × 2	...	20·2	2·5	At once.
”	2 × 6	21·0	23·5	1·70	Across the Bed.
”	4 × 4	8·0	41·0	2·5	
”	6 × 6	64·0	86·0	2·4	
4″	2 × 2	...	3·0	0·75	
”	4 × 2	...	17·0	2·12	
”	4 × 4	25·75	29·25	1·82	
”	4 × 4	24·25	28·75	1·85	
”	4 × 6	31·0	45·0	1·87	
”	6 × 6	48·0	82·0	2·27	*a* Very slight, external.
		a	*b*		*b* Not crushed.
6″	2 × 2	2·8	3·4	0·85	
”	6 × 2	...	10·0	0·83	
”	4 × 4	18·0	20·45	1·27	⊥ To Bed.
”	6 × 4	28·0	32·0	1·33	
”	6 × 6	64·0 *c*	70·0	1·94	*c* Very slight.
”	6 × 6	55·0	68·75	1·90	

Table E.

Table shewing strength under pressure of different Materials.

4″ Cubes.

Materials.	Cracked	Crushed	on sq.in.		Remarks.
	Tons	Tons	Tons.		
STONE—					
Portland.					
„ Brown Top Bed	...	26·7	1·66	average 1·11	went at once.
„ „ „	19·8	23·0	1·43		at L to bed.
„ „ „	17·8	19·0	1·18		at L to bed.
„ „ „	16·7	17·5	1·09		
„ „ „	14·1	16·2	1·12		at L to bed.
„ „ „	...	15·8	0·99		went at once very shelly
„ „ „	7·5	12·2	0·76		split both horiz. & perp.
„ „ „	10·6	11·5	0·70		
„ Base or Best Bed	32·6	36·2	2·25	average 1·42	split horizontally.
„ „ „	13·5	28·0	1·75		
„ „ „	26·4	27·0	1·68		
„ „ „	18·0	20·1	1·25		on bed.
„ „ „	16·4	16·5	1·31		„
„ „ „	11·4	14·4	0·90		L to bed.
„ „ „	13·3	13·4	0·83		„
Mansfield.					
„ Red - -	39·0*a*	40·1	2·5		*a* at 28·0 scaled off in small pieces.
„ „ - -	49·7	68·8	4·3		both very fetid.
„ White -	21·5	36·4	2·27		scaled at 21·5
„ „ -	12·0	24·0	1·5		
Forest of Dean—White	17·5†	47·8	2·98		† slight crack, external only.
„ „ „	43·0	45·0*	2·81		* not considered very best.
„ „ „	30·0	40·0	2·5		all broke suddenly like iron.
„ „ „	38·0	39·4	2·46		
Bath.					
„ Corsham - -	8·0	8·84	·55		
„ „ - -	...	8·3	·51		crushed suddenly.
„ „ - -	7·5	8·1	·51		
„ Box Best Bed	...	5·4	·32		
„ „ Ground „	...	8·6	·53		broke at once into 4 cones.
„ „ „	5·7	5·85	·36		
„ „ „	...	4·35	·32		
Caen - - - -	8·2	15·4	·93		
„ - - - -	7·5	12·7	·79		
Gypsum.					
Derbysh. Alabaster	10·9	11·0	·72		
Marble.					
Cornwall Serpentine „ Poltesco Green	25·0	52·0			at 15·4 slightly at 40· going fast, smashed.
„ Signal Staff Blk. & Rd.	10·0	51·0	3·2		smashed.
„ „ „	10·50	37·75	2·35		
SLATE—					
North Wales.					
Machynlleth -	...	83·5*a*	5·21	average 4·086	*a* at 71 a splinter flew off.
Bangor (Penryhn)	...	80·0*b*	5·0		*b* no effect, neither broke.
Portmadoc. Welsh Slate Com.	20·6	75·3	4·70		
Festiniog ditto -	20·0	70·5	4·40		
„ „	...	63·0	3·93		
Maenoffern - -	23·6	65·4	4·08		
Pen-Machno, Conway	...	48·8	3·05		
Dinorwic, Llanberis	...	49·0	3·06		
Cornwall.					
Delabole - -	52·0	61·6	3·85		broke at L to bed.
Ireland.					
Valencia - -	...	57·3	3·58		

4″ Cubes.

Materials.	Cracked	Crushed	on sq.in.	Remarks.
WOOD—	Tons.	Tons.	Tons.	
Teak, Moulwein	...	50·8	3·17	crushed endways.
Deal, Archangel	...	28·8	1·11	„ fibres torn apart.
Concrete.				
1 Lime 3 Ballast -	...	5·1	·31	3 weeks old.
1 Slk. Lime 3 Ballast	...	5·2	·32	
Martin's Cement -	...	14·85	·92	22 hours old.
Plaster, Common -	...	4·95	·30	22 hours old.

9″ BRICKS.

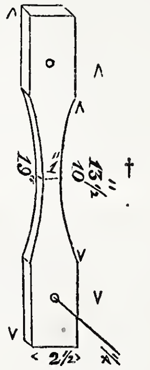
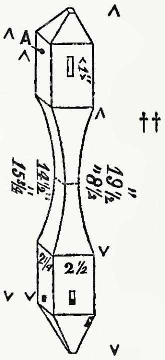
	Cracked	Crushed	on sq. in.	Remarks.
	Tons.	Tons.	Tons.	
Common Stocks - -	...	30·0	·7407	
„ „ - -	...	18·0	·4432	
„ „ - -	...	12·0	·2962	
„ „ ground sides	22·5	26·8	·6616	
„ „ „ „	...	31·5	·7777	
Burham Brick - -	59·8	73·6	1·817	
„ „ - - - -	...	80·0*a*	1·985	*a* Not crushed.
„ „ - - - -	...	62·0*b*	1·340	*b* Cracked slightly, not crushed.
Place, bad - - -	8.4	9·0	·2222	
„ „ - - -	8·0	10·7	·2641	
Grizzle - - - -	...	14·0	·3456	
Stocks, 2 joined in Mortar	5·0	8·7	·1071	
† „ „ in Cement	7·0 *	15·35 *	·1896	* Small pieces flew off at intervals, but cement stood.
Place, 2 joined in Mortar -	...	5·3	·0641	† About 14 days old.
† „ „ in Cement	...	9·4	·1160	

Shafts, 12 inches long, 3 inches diameter.

Materials.	Cracked	Crushed	on sq.in.	Remarks.
Stone—	Tons.	Tons.	Tons.	*All yielded vertically.*
Portland, worked -	7·3	10·25	1·48	bedded in leather.
„ rgh. tooled		8·57	1·00	„ in plaster.
Marbles (Devonshire)—				
Ipplepen, Mottled Red	9·2	10·7	1·37	
Poltesco, grey-green	4·3	4·3	·60	went across and not with vein.
„ „	...	6·0	·84	went at once.
Signal-Staff, rd. & blk.	...	33·5	4·73	went in fragments.
„ „	20·0	22·5	3·18	„ „ „
„ „	12·75	16·25	2·29	
Cadgewith, grn. & blk.	16·92	17·62	2·49	
Wood—				
Deal, Archangel - -	...	19·1*a*	2·70	*a* lost 3-16ths in length: point of yielding 5-12ths of length in both.
6″ of above sawn off left,	...	19·3	2·73	
Deal, Archangel - -	...	16·3*a*	2·30	
6″ of above sawn off left,	...	19·4	2·74	
Teak, Moulwein - -	...	18·25*b*	2·58	*b* lost 1-8th and point of yielding about same.
6″ of above sawn off left,	...	18·7	2·64	
Teak, Moulwein - -	...	16·0*b*	2·26	
6″ of above sawn off left,	..	17·75	2·50	

TABLE F.

Table shewing Tensile Strength, form suggested by MR. DINES.

MATERIAL.	Age in days.	Section of Fracture.	Breaking weight in lbs.	lbs. on the square in.	Form.	REMARKS.
Portland Stone	...	1·07 × 1·07	304	264	 †	
		1·03 × 1·05	432	400		
Sicilian Marble	...	1·13 × 1·01	1064*	931		
		1·02 × 1·13	1394	1216		* At 800 lbs. not damaged, a slight crack before breaking.
Cements—Martin's	3	1·06 × 1·02	344	318		
	26	1·04 × 1·02	880	829		
	36	1·05 × 1·03	592	538		
	57	1·06 × 1·02	952	880		
„ Portland pure	26	1·06 × 1·0	784 *f*	739		
	34	1·06 × 1·05	392 *a f*	352		
	36	1·05 × 1·02	728 *f*	680		*a* Broke in the eye.
	36	1·05 × 1·01	424 *b*	400		*b* Put together strong, minimum of water.
	36	1·06 × 1·05	... *c f*	...		*c* Broken instantly in eye.
	42	1·07 × 1·08	624 *a f*	539	A ¼ of an inch iron rod	
	42	1·07 × 1·08	536 *a f*	464		
	44	1·1 × 1·04	616 *b*	529		
„ Portland - - 1 „ Sand - - - - - 1	37	1·1 × 1·08	88 *d*	74		*d* Mixed soft, maximum of water.
	39	1·02 × 1·08	344 *b*	312		
	40	1·05 × 1·0	172 *d e*	160	††	*e* A small stone in centre of fracture.
	40	1·04 × 1·07	216 *b*	194		
	42	1·0 × 1·01	176 *d*	176		*f* Mixed as usual.
„ Portland - - 1 „ Sand - - - - - 2	51	1·09 × 1·02	112 *f*	100		
	53	1·1 × 1·04	160 *f*	149		
„ Roman, pure	13	1·04 × 1·07	266 *g*	239		*g* Extra stiff.
„ „ „	18	1·06 × 1·02	208 *h*	192		*h* As usually made, air bubble in fracture.
Plaster, Coarse	4	1·04 × 1·1	88	76		
„ „	11	1·0 × 1·1	... *i*	...		*i* Twisted and broke instantly.
„ „	35	1·04 × 1·02	104	98		
„ Fine	49	1·01 × 1·07	264	244		
	49	1·04 × 1·07	344	309		

SOME OBSERVATIONS UPON EXPERIMENTS ON ARTIFICIAL STONE, &c. UPON READING THE REPORT OF THE COMMITTEE THEREON.

By Octavius Hansard, Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, May 30, 1864.

Upon the appointment of your Committee last year, for the purpose of making experiments on artificial stone, I was requested by them to conduct the enquiries and superintend the investigation of the processes submitted; and therefore deem it right, upon the presentation of our Report this evening, to offer a few remarks, showing how we proceeded upon those investigations, and some observations upon the results. I regret that we had not more responses to our invitation to patentees; but probably that was owing to the conditions that were laid down by the Council, that we were to enter solely upon the enquiry as to artificial stone. After applying to several firms for the use of their yards to carry on our experiments, we succeeded in gaining permission from Mr. Dines to use his; and he subsequently placed his men, materials, and his hydraulic machine, at our disposal at all times. The gentlemen who had answered to our advertisement were then invited to submit their processes.

In order to test the cohesive strength of the respective materials submitted to us, and by comparison draw some conclusions, we had wooden moulds made, cubes of 4-inch sides. Mr. Dines provided the materials, which were mixed before us, except Messrs. Bodmer's specimens, and some of Messrs. Ransome and Wheeble's; and these were carefully marked, and placed exposed or otherwise, until the time arrived for testing them. The ommittee represented to those gentlemen who did not prepare samples before them, that a guarantee as to the truth of their statements would be accepted; but whatever the results, this fact would be made known.

Bodmer's Patent Compressed Stone Bricks, although not absolutely coming under the denomination of artificial stone, were seemingly of so interesting a character that the Committee accepted and tested their strength at various ages. Table C shows you the results.

Mr. Wheeble sent several bricks of the Reading Abbey Concrete Stone, and specimens, 4-inch cubes and 9-inch bricks in our own moulds, were made before us. From Table C, of results, you may perceive how little they are adapted to resist crushing weight, their composition being uncertain; their chief ingredient often being large stones and granite, at other times small gravel. The cubes noted *e*, *e*, three weeks' old, not composed of Bridgewater lime, crushed at 2·0 tons, or ·135 of a ton on the square inch; whilst the weakest of Ransome's, at three days, bore 6·05 tons, or ·378 of a ton on the square inch; and Coignet's, at four weeks, 3·8 tons, or ·237 of a ton on the square inch; and in Wheeble's there seemed little cohesion, as when crushed the lime fell through almost pure.

Mr. Charles Martin Westmacott's process was described on the evening last year, when Mr. Kerr read his paper. He claims, chiefly, the mixing of any carbonate of lime with lime, cements, or with the combination of lime and cements, preparing his mixture in different proportions, and sending it out as lime, the sand being added in the usual manner; his principle being to have always a much larger proportion of insoluble to soluble matter. It hardens by age and atmospheric influences, and is suitable both for internal and external stucco. This latter is composed of one part slaked lime to two of chalk, and can be used either as stucco or as common mortar; or if mixed with cement, as a good cement mortar. If for internal or quick stucco, the combination is one of chalk and two of unslaked lime, mixed pure with sand, before adding water; but for sending any distance, or for keeping, other materials are added.

The first combination, external, is to be treated like lime, and therefore must be used directly. The difference between this and the internal or quick stucco, is that the material used for the latter before being guaged, has been dry slaked; when placed on the wall hardens and sets at once throughout its mass; whilst the other, slacked, is like mortar, hardens gradually, but differs in this respect, that the induration commences at once from the surface, and is continuous.

The chemical action seems to be that all the original carbonic acid being removed from the lime by its original burning, by its mixture with carbonate of lime about ·75 is reinstated, and directly induration is commenced, or the taking up of the carbonic acid (which, in mortar, has to be supplied by the atmosphere in the course of time), until it gradually attains the full amount it originally had in the rock, approximating nearly to the original stone.

Mr. Westmacott tells me that Messrs. Francis can produce his material, as sent out for immediate use, at 8d. per bushel, and the best for keeping at 15d. (of course, exclusive of sand). The samples we had made on the 5th of May, 1863, $\frac{3}{4}$-inch thick, have been exposed on a wall facing S.E., in Mr. Dines's yard, and have hardened completely. I have here several examples of the quick stucco for ceilings, which were made at four o'clock this afternoon: and you can judge, by inspecting them, their value, at least as to setting and drying. The operation referred to in the report made before us in May, 1863, was similar to one of them.

Mr. Ransome, when invited, stated that it would not be politic for him to manufacture his concrete stone away from his own premises, to which the Committee replied that they did not think it advisable that any experiments on which they had to report should be carried on except under their immediate supervision; they accordingly met Mr. Ransome in Cannon Row, and he explained the principle, and exhibited the details of his process; but stated that what he then made could in no wise be taken as representing either its quality or strength. Amongst other samples, there was made an ordinary 9-inch brick, which was marked, and to which I will again refer. The result of this meeting was, that we were convinced that Mr. Ransome could not make his specimens except at his own works, and he undertook to make the best samples of his stone, and forward them to town, to be tested by us at given intervals. The results upon these experiments tried from May to November were so unsatisfactory to us, and to Mr. Ransome, that a visit to his works was arranged. The results under pressure, Table B, of the samples then made were not at all satisfactory; but Mr. Ransome has subsequently stated that he had no idea at the time they were made that they were to be so tested, having prepared them for exposure to atmospheric influences only. It appears hardly necessary to explain Mr. R.'s process, after that given by him last year in these rooms; but to some it may be interesting to know his process, as witnessed by us.

He first dissolves flints in caustic alkali, at a temperature of 350° Fahr., leaving them in the boiler 24 hours. He then draws off the liquid produced, viz., silicate of soda, and allows it to evaporate until it becomes a thick matter like treacle; mixes it next with clean pit sand, incorporated with five to ten per cent. of chalk, in a pug-mill, in certain proportions, as per Table B; and in four to five minutes this mixture is formed into a stiff putty. It is then pressed into a mould, and placed in a solution of chloride of calcium, and rapidly saturates, resulting in a formation of an insoluble silicate of lime and a soluble chloride of sodium. This latter has to be removed by washing, to effect which it is placed in a hot-water bath for many hours.

From the table B in your hands, you will perceive that the result as to strength is anything but satisfactory, as great variation is shown, even when up to a certain point there is an apparent increase in strength from age; and whenever this is not observed, the retrogration appears always to have been caused by the imperfect combination of the ingredients, the induration not having penetrated the entire cube; and I attribute this to the saturation of the solution of chloride of calcium not being complete, owing to the moulded material being placed in it, rather than the chloride being poured over it; and I am led to this conclusion from the fact that the specimen marked R. I. B. A., and which I said I should refer to, was made before us in Cannon Row, and treated in this manner, it being a brick hollowed on one side, which was gradually filled with chloride of calcium, and took 15 minutes to saturate, perminating gradually. This was taken away by me, never washed at all, and when after 12 weeks it was crushed, was thoroughly indurated; but of course not free from salt, never having had the sodium washed out of it, and bore, as you see, 35 tons or ·863 of a ton on the square inch; as against a specimen brick from Ipswich, eight weeks old, 30 tons, or ·733 of a ton on the square inch; and a 4-inch cube, eight weeks old, or ·437 of a ton on the square inch.

I am bound in justice to Mr. Ransome to state that he invites further investigation, assured that it would lead to other results, and is desirous that anyone should select, at discretion, from the many hundreds of examples, and of every variety of shape, at his works, in order to satisfy themselves that this conclusion is unfounded, and that more reliable results would ensue.

I now come to Mons. Coignet, and as at our former meeting his process was not entered into, I will endeavour to explain it, as exhibited before the Committee.

The materials were supplied to Mons. Coignet, consisting of Thames sand, Medway or Burham grey lime, and Portland cement, and he brought with him a model of his machine for mixing. His process consists of two main operations:—*First*. A complete consolidation of the materials with little water. *Secondly*. The steady but not violent compression of the consolidation in moulds.

Mons. Coignet mixed dry the cement with sand and lime, and, whilst mixing, sprinkled them with a little water. This mixture was thrown into the machine (apparently an endless screw enclosed in a cylinder,) at the rate of two shovelsful of mixture, followed by about a quart of water, until the cylinder was filled. The screw (turned by two men) delivered the mixture through a series of holes in the bottom of the cylinder.

On this occasion Mons. Coignet requested permission to re-pass the materials through the cylinder on the ground, that the mixture produced in the double passage through the model was only equal to that resulting from a single passage through the machine, of 10 to 15 horse power, which he employs in actual work in Paris. The measure used was equal to about the French "lître," or 2¼ lbs., and the proportions of materials about 180 sand; 44 lime, produced by slaking; 33 Portland cement; and 20 water. This mixture, after its delivery from the machine, was put by degrees into moulds, and each layer rammed by a workman.

Mons. Coignet, in reply to enquiries put to him by the Committee, stated, that chalk lime was not sufficiently hydraulic for his purpose; that lime merely delivered as ground had always some core left, and therefore had to be reduced to powder, by slaking it with one-fifth of its bulk of water for forty-eight hours, before employed; and that such powdered lime was equal in effect to two of common ground lime; that when very hard mortar was required it was necessary to use less water and more sand than usually adopted; that the water having evaporated from the mortar as usually made leaves it full of minute holes, and that more the water, less is the crystallization. In the mixture as given above, if cement is used as a twentieth it requires to be twice passed through his machine, in Paris, but if used as a thirtieth, only once; that he found by experience, that the purer the lime the quicker was the crystallization, and that although pure hydrate of lime will take carbonic acid, silicate of lime and alumina will not take it, because silicic acid took the place which carbonic acid did with the pure lime; and frankly admitted that his first experiments, in 1855, in marine works, had not entirely succeeded, but claimed perfect success for his works at Marseilles, since 1859, and for those now executing in Paris and elsewhere.

With respect to the comparative value of Mons. Coignet's and Mr. Ransome's in Table B. From the average of the four examples I have taken, Mr. Ransome's appears to be rather stronger, viz.—Coignet's ·328, Ransome's ·407 tons on the square inch, and whilst in both there is a gradual progress as they advance in age, Coignet's is steady, and Ransome's uncertain; they neither appear much stronger than concrete three weeks old composed of one lime, three ballast, which bore ·31 tons on the square inch, or than Bath stone, which on the average of seven examples, bore ·45 of a ton on the square inch.

With regard to experiments on Table E. showing the crushing weight under which each block lost its power of cohesion, most are made upon 4-inch cubes, on materials carefully selected, and tested by the same machine, and vary very considerably in results;—I have not collated these tables with a view to enter into competition with the giant investigators, Hodgkinson, Fairbairn, Rennie, Clark, Vicat, or others, but to enable you to draw comparisons with the artificial materials now under consideration, or upon any which may be experimented upon at any future period. It must be borne in mind, that the resistance of all materials is seriously affected by various circumstances, viz., the condition of the atmosphere; their own nature, and the time during which the load is left upon them; in all cases an approximation only to the truth can be arrived at. All the specimens experimented upon by us were subjected to a continual action from an hydraulic ram (Bramah), with a self-registering guage in decimal parts, and whose limit was up to 100 tons. The results on these exhibit the care that should be taken upon calculating from tables giving isolated examples of crushing weights, unless made upon large averages. In the one before you, in the eight blocks of Portland stone, top bed, there is a variation of from 26·7 to 11·5 tons crushing weight, or on the square inch from 1·66 to 0·70 of a ton, the average being 17·1 tons crushing weight, or 1·11 on the square inch; and on the seven blocks from the best bed, a variation from 36·2 to 13·1 tons crushing weight, or on the square inch from 2·25 to 0·83 of a ton, the average being 2·25 crushing weight, or 1·42 on the square inch. As in bricks so in stone, the resistance is modified by the mortar or cement inserted in the joints, and authorities on this subject seemed agreed that in practice it is only safe to allow executed work to be weighted with a load equal to one-seventh of the crushing weight, and when materials are small, such as bricks, or stones of small dimensions, rubble, &c., one-tenth would appear to be the safest limit.

The results on bricks show the truth of the oft repeated statement, that as everything depends upon their thorough-burning, no reliance can be placed upon any results obtained from experiments made upon them. You have here common stocks, of a good make, picked haphazard, crushing under weights, the maximum being 31·5 tons, the minimum 12·0 tons, whilst the same stocks joined in mortar and cement, two weeks old respectively, crushed at 8·7 and 15·35 tons.

I would draw your attention to the examples of the shafts 12-inch long, 3-inch diameter, which are somewhat interesting from their respective fractures. This Devonshire serpentine, Polteseo grey green, one of the weakest examples, went across and not with the vein, which in this shaft runs in the line of the diameter, and to those of wood, which after yielding about five-twelfths of their length, the remainder not injured was sawn off, and again tested, and bore a greater resistance than the whole length originally. The deductions to be drawn from the table of samples, suggested by Mr. J. W. Papworth, on cubes of Portland, of various heights, by their respective beds, have been given in our report.

The Table F., giving examples of the strength of materials, particularly cements under tension, are from moulds suggested by Mr. Dines, the variations of which are very singular, but no doubt these are to be attributed to the absorbing power of the materials, as in Roman or natural cements, if, at the moment of application, they be so dry as to draw from the cement the water necessary for its crystallization the resistance is less, and in those examples where lime is a principal ingredient much depends upon its being sufficiently burnt.

I believe I have now brought before you all the chief points resulting from our investigations, and I fear that I have wearied you with these hard, dry details. Before concluding I must take this opportunity of thanking those gentlemen with whom, during these investigations, I have associated, for their courtesy and ready willingness to render me any assistance, and especially to Mr. J. W. Papworth, who was present at all our meetings, (sixteen) varying from five to seven hours each, and who was most active in assisting and carrying out these experiments. When I was requested by the Committee to conduct these enquiries, I accepted the office with great diffidence, having had but little experience in such matters; but I shall not regret the time and trouble involved during the past fifteen months if I have succeeded in satisfying you with the results, and if from them attention may be awakened on the part of any towards acquiring a sufficient number of facts from actual experiments, whereon to found the basis of a correct knowledge of the strength of materials, and determine on the properties and suitability of new inventions for building purposes.

Professor Kerr, on being called upon, reminded the meeting that a paper which he had read last year had given rise to this enquiry, and that he had had the honour of being put on the Committee, although he had not, as it happened, attended any of the meetings. He had listened with great interest to the report, and to Mr. Hansard's further description of what had been done; and, of course, one could scarcely pretend to follow closely such an intricate statement; but the general impression left upon the mind must be exceedingly satisfactory. In the first place the Committee had evidently taken very great pains, and had arrived at experimental results which must be considered of very great value; and secondly, he hoped Mr. Ransome, M. Coignet, and any others interested, would not be led into the idea that it was necessary for them to defend their pretentions against the deductions of the Committee. (Hear, hear.) It would be seen that the experiments went no further than the one question of the test of strength under pressure; and he ventured to think that there was no necessity for any defence of any particular material against these results, because with the exception of place bricks, and other such accidentally imperfect specimens, there was no doubt that the mere strength of these materials was quite equal to all ordinary constructive demands. But there was one other question upon which he thought the Committee might still be requested to pursue its investigations—a question, in point of fact, which he thought, when they came to reflect upon it, they would see was even more important than the question of strength. This last, in fact, he considered to be decided in favour of all the materials. But if they were to be used in building in London, the more important question was as to their durability when exposd to the London air. As far as he could remember, that was the point to which he had directed particular attention in his own paper, already referred to. Subject to the correction of chemists, he would suggest the testing of the substances for this purpose, by means of diluted sulphuric acid, or some other similar application, which might be thought, upon investigation and consideration, to be better; and he thought that during the Recess it might be well if some gentlemen, who were interested in the subject, would take this trouble, because the interest which they, as architects, felt in artificial stone—at any rate, in London—was not so much as to the production of a material which should supplant brick for constructive purposes (for good brick-work was all that could be desired for walling), but as to the production of a material which should supply the place of natural stone for decorative facing. As regarded Mr. Ransome, he was now, after all these experiments, precisely in the same position as before; they were not yet informed how far his material would resist the action of the atmosphere, and that was the point upon which information was chiefly desired. As for the stone of M. Coignet, it was apparently an engineer's material, and not one for the use of architects. It was a material to be made in large masses, and deposited for heavy and strong walls; and he had no doubt the results upon careful examination would bear out the opinion which he had formed superficially, that M. Coignet's stone was for engineering purposes exceedingly valuable; but for the decorative purposes of the architect it seemed to be valueless—at any rate, in the form in which it was presented now. But he recollected, by the bye, that last year M. Coignet exhibited decorations—in fact, some little sculptures—which seemed to be exceedingly good things in their way; he was sorry to see that they were not in the room now, and should like to hear more about them. Mr. Westmacott, also, whose patent he was glad to hear so favourably spoken of, might produce some surface blocks of his material (which was scientifically quite different from the others), and have that tested also. The same test might be applied to terra cotta, bricks, and natural stone; and he thought that in the course of a little time, a very valuable series of results would be derived from such experiments. The conclusion, however, at which he had individually arrived, was to prefer terra cotta to all these artificial stones. He fancied that in terra cotta they had the future material for improving the decorative effect of ordinary London building. There was, however, a gentleman present (Mr. Blashfield) who could speak for himself, as regarded terra cotta, as a manufacturer. That gentleman had given him such wonderful accounts of what he could accomplish with that material, that he was only surprised it was not used to the utmost extent. It seemed to him, from the description which Mr. Blashfield had given him of the manufacture of his material, that it was particularly adapted for London use; and if it could be produced, he would not say at a moderate expense, but at a very low expense—because what was wanted was something decidedly cheap—then the problem would be solved. He did not wish, however, for a moment to disparage Mr. Ransome's invention; he had the highest opinion scientifically of it; and he should like very much to have it ascertained that Mr. Ransome's material would efficiently and satisfactorily stand the atmospheric test. He would venture to move a vote of thanks to the Committee for their most laborious services to the Institute, and also a vote of thanks, more especially as regarded that evening, to Mr. Hansard, for the very lucid way in which, considering the nature of the subject, he had laid the results before them. He was sure that the meeting could not possibly pay too high a compliment to those gentlemen who had engaged in this investigation, for the very great time and care which they had bestowed upon it.

The Chairman suggested that they ought not now, perhaps, to go into the question of terra cotta, but confine themselves to the consideration of the Report.

Mr. G. R. Burnell, C. E., Visitor, would simply say with respect to M. Coignet's material that Professor Kerr appeared rather to have mistaken the object of the patent, which, in fact, was to make a cheap kind of concrete; and he might say that M. Coignet had recently executed a church in the neighbourhood of Paris entirely in that material, and in it he had produced all the mouldings of Gothic architecture, both externally and internally. With regard to terra cotta, he did not know whether that could be safely brought into competition with any thing that was used at present in the shape of bricks; for bricks were, in fact, a terra cotta.

Professor Kerr said he should like to ask Mr. Burnell whether the church to which he alluded was built by way of pisê or in blocks, Mr. Burnell having replied that it was by way of pisê, Mr. Kerr said that was quite a different thing from the blocks with which they had been dealing, and M. Coignet professed to make the material in blocks, and to use it as artificial stone.

Mr. Burnell said it could be used either way, and M. Coignet had lately executed some bridges of 140 feet span in this material.

Mr. C. H. Smith, Contributing Visitor, said there was nothing which would represent the action of the atmosphere; from a long experience he was prepared to say that with certainty.

Mr. J. W. Papworth, Fellow, observed that he might say that the subject had been carefully considered at one of the meetings of the Committee, and that without making a formal minute of their decision, they agreed that they could not rely upon any chemical or mechanical experiments on the matter in question sufficiently to insert in their report, if such experiments were made, such a paragraph as would appear to give information to the meeting.

Mr. **Boulnois**, Fellow, asked whether the Committee had considered it desirable to ascertain the absorption of the blocks at all.

Mr. **Hansard** replied that the Committee did enter into that question, with regard to M. Coignet's material; but it was not considered necessary with Mr. Ransome's, as Professor E. Frankland, F.R.S., had already done so, and whose report had already been published in the Transactions of the Institute of last year. The samples of M. Coignet's that they tested were Nos. 3 and 4. At the end of the first week they were broken into two, and one-half was placed in water for two weeks. It then weighed six ounces, and it was then dried in an oven and weighed 5⅜ ounces, so that it absorbed five-eighths, or one-seventh of water.

Mr. **Ransome** said there had been some experiments carried out by Professor Frankland to ascertain the capability of the patent concrete stone to stand the action of the atmosphere, and a report had been published, and, he believed, had been brought before the Institute. The test was immersion in sulphuric acid, with subsequent boiling in water and brushing. The experiments were carried on at the same time, and under the same circumstances, with the various descriptions of natural stones, and a comparison drawn, when the total loss from all causes was found to be less in the Patent Concrete Stone than in any of the natural stones which were tested, excepting Park Spring.*

Mr. O. **Hansard** handed to the Chairman what he stated to be an interesting specimen of Mr. Ransome's stone, which until that evening had been in water ever since the day it was made, last May. It might interest some who liked to investigate the chemical action which had been going on. It had been previously carefully washed by Mr. Ransome to remove the sodium, and had, notwithstanding, deposited a considerable quantity of salt, and yet had much left in it. He did not consider that the period over which their investigations had extended had been long enough to arrive at any conclusion as to the weather-resisting power of the material.

Mr. **Morris**, Associate, said there was one artificial building in London, or rather a building where a substitute for bricks had been very extensively employed, and that was the Imperial Fire Office in Pall Mall, which was a large house, and was carried to a great height. That house had now been erected, he supposed, for some thirty years; and therefore as far as a mere substitute for brick was concerned, that question had been solved for a very long time, and he did not think that their attention needed to be directed to this point, when they were speaking of artificial stone. He thought that should the Committee extend their very valuable enquiries yet further, it would be desirable to explain the appearance of the substances they had tested, because when an architect was about to select a stone for ornamental purposes—and that was what they wanted artificial stone for—he had to look at it with regard to its suitable appearance for those objects; and therefore he thought that if the Committee were to express their opinion as to the general appearance and colour of the stone, it would add very much to the value of their report.

Mr. **Hayward**, (Hon. Sec.) in reply to the question put by Mr. Morris, said that with regard to the general appearance of most of the specimens of Mr. Ransome's material they were all that could be desired, and if it could only be manufactured so as to resist the influence of the London atmosphere he would certainly confer a very great benefit upon the building community. The only difficulty which they all felt, and which had arisen in the discussion so early in the evening, was this very point of durability. He (Mr. Hayward) could mention circumstances in connection with Mr. Ransome's stone—quite independent of any experiments which had been made by the Committee. In the very coldest part of the last winter he had made application to Mr. Ransome as to the use of a certain portion of his material for some balcony panels, and enquired especially as to the action of severe frost upon it. Mr. Ransome kindly sent him a specimen which had evidently been subjected to frost, having come up from Ipswich with a great mass of ice in it. This had been lying about in-doors and out ever since, exposed to all temperatures and weathers, and without any apparent damage. If the material had been incapable of bearing any ordinary amount of atmospheric influences it could not have stood this test in the severest part of the winter. From what he saw, therefore, of that specimen, (and he supposed it was an average specimen, for it was sent up from the works directly the question was raised,) he should have no hesitation himself in applying the material to the purpose for which he thought of using it at that time. He believed the great advantage of terra cotta was this, that there could be no doubt of its being perfectly capable of resisting all atmospheric influences when well made. The extent to which it had been used, and the length of time it had resisted all weathers and climates, made him feel perfectly safe in adopting it. As Professor Kerr had alluded to the subject, he might say that he had seen some of the "wonders" which Mr. Blashfield was doing with terra cotta, at his works at Stamford, and having investigated the matter himself, he could say, from personal observation, that before the material went into the ovens it was in such a hard, close, and compact condition that it was turned in a lathe, and so adapted to the most delicate forms which they could desire. Moreover, the specimen which he saw, after they were baked, held their forms as exactly and as purely as could possibly be done if they had been worked out of stone by hand. As far as he was able to judge then, he believed that the manufacture of terra cotta was brought at the present time to great perfection, and nobody need doubt that it could be introduced to an enormous extent, and it was really wonderful that it had not been so already. He only hoped that Mr. Ransome's material would turn out eventually to be as good as terra cotta, and he thought it would then soon find a place for itself, seeing that it was capable of being so very easily moulded and in such a short time prepared for use, and not being necessarily subjected to the peculiar influences of heat, which rendered terra cotta so liable to twist and get out of shape.

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* Vide Copy of the Report, Trans. R.I.B.A., 1862-63, page 159.

Mr. J. W. PAPWORTH felt that it would be very desirable for members to understand that with regard to terra cotta durability was simply a question of excellence in manufacture. In 1827 some of the finest terra cotta of that time was exposed; in 1837 he placed by its side a piece made by another manufacturer; in 1847 they were accompanied by a third piece made by another firm; and in 1849 all three had perished: that which was made in 1827 had not gone so badly as the others; that made in 1837 was pretty much in the condition of the boiled flints now exhibited; and that made in 1837 was literally mud. The reputation of the manufacturer was the only guarantee which they could have for the excellence of the material. With regard to the question of the atmosphere he would only say, that from his own experience and from the lessons which he had been taught in early life, he believed it was impossible to judge whether a factitious material would or would not stand the atmosphere, until it had been exposed for several years.

Mr. AITCHISON, Fellow, wished to say a few words on this subject. The experiments which had been made were very interesting, but he did not believe that they went far enough. As far as artificial stone was concerned he supposed there were very few architects who were interested in knowing the exact weight which it would bear when used for the mere purpose of decoration, but as far as these materials were used for foundations it was a very important subject indeed. Where a great weight had to be borne they frequently had to carry up foundations from a very great depth, and it was of very great importance to meet with some material that could be used at a comparatively low cost. The experiments which had been made on these small cubes, of course, gave no idea of how the materials could be applied in large masses in foundations for piers or columns, but it would be a most important thing if they could know that there was a material, at an expense very little more than concrete, which would answer the purpose. Professor Kerr said, materials generally were strong enough for the purposes to which they were adapted, and especially bricks, unless they were place bricks; that might be so generally in houses, or in buildings of small size, but it was not at all so in large buildings, more especially if such buildings were intended to carry heavy weights. One question which he had not heard raised was, whether the material was fire proof. Cements, as they knew, were not fire proof, mortar and plaster of Paris excepted. In all the large warehouses which had lately been burned the fire had hardly touched the mortar, or only to the extent of about three-quarters of an inch, and in no case had the brick work been seriously injured by the effects of fire, except where, from the swelling of large masses, it had cracked, but where cement was used it flew to pieces like red hot glass when dipped into water; in some instances to which his attention had been particularly called, the heat had been so intense that the bricks had been vitrified, and had run down like icicles, and there the mortar was uninjured, except in portions, and the walls were used again for the new building. It very frequently happened that in buildings for storing inflammable goods it became of very great importance to be able to use some fire proof material. So little was known about wrought iron at the present time, that it was impossible to say whether supports might be made of it which would stand when they were made red or white hot. They knew that brick piers would answer the purpose, but there were some cases in which they could not be used on account of the large space they occupied. He knew warehouses with six floors, in which a bay on each floor was loaded with twenty tons, or one hundred and twenty tons on the lower supports, and taking the experiments which had been made on brickwork in cement, he found that one square foot of brickwork would be crushed with about twenty-eight tons weight, which nearly agreed with the experiments made on the subject before the fixing of the Britannia Tube, and taking that experiment, with the statement that the working load was only one-tenth of the crushing load, he found that to support the requisite weight in the warehouse which he had mentioned they would require a pier six feet by seven, or forty-two feet more than one-fifth of the area of the whole bay of two hundred feet, which was so large a space that it really became a very important question. In the houses which had lately fallen down at Hackney, there was a great weight put upon a small bearing, which pinched the bricks, and the whole thing gave way. It was well known that the Romans made nearly all their buildings of concrete, either facing them with stone, brick, or terra cotta, and he believed there had been several patents taken out for building houses with concrete, and then facing them with slabs of terra cotta. The question, therefore, was not whether buildings could be formed of artificial stone, but whether it could be used advantageously in point of space and cost. If they tried the strength of these materials at all, the main thing which they wanted to know was how they could use them for foundations. As far as other materials went he had suggested, but unfortunately he was too late, that some experiments should be made with bricks and mortar at certain dates after they were first set, for when buildings were first put up they were frequently loaded before the mortar had time to set, and in all cases the green brickwork had to bear the weight of the superstructure, and if fire had to be guarded against they could not be built with cement. It was a pity that some of the experiments had not been carried a little farther, so as to see how the usually admitted formula for the strength of columns could be applied both to wood and stone. There was a certain artificial stone which had been used, and which he believed, at any rate had answered the purpose of utility if not of beauty. It was called Granitic Breccia; but he did not know whether it was still manufactured; it was made with broken Portland stone and Portland cement subjected to pressure, and covered over with silicate of soda. He had used it, and seen it used in several places, principally as paving, and he believed it answered the purpose most thoroughly.

Mr. JENNINGS, Fellow, said that as no one had actually seconded the vote of thanks he rose to do so. He should not venture to make many observations upon the subject before them, because there were many others present who were much better acquainted with it than he was, but as regarded the question of colour, he thought that was a matter of considerable importance, because, looking at the specimens on the table, the colour was certainly not very satisfactory. With regard to determining the question of how long the stone would stand, he thought that what had been referred to by the Secretary was important, and that in addition to the sulphuric acid test, they should try the effect of frost, and of a rapid thaw, which appeared to be one of the greatest tests which they could apply to stone, and he imagined it would be the same with artificial stone. He did not know whether the Committee had taken into their consideration at all a French patent which existed for making stones of slate dust. He believed it was made under pressure with some mixture of asphalte or pitch. There was certainly one objection to it, that it was black, and therefore its colour would render it fit only for some purposes, but he was rather curious to know what the result of that patent had been.

Mr. BURNELL said he saw the church which he had spoken of, which was being built by M. Coignet, near Paris, on the fourth of January in this year. The works had then been proceeding during the very hard frost which set in in Paris on the first of January, but no effect whatever had at that time been produced on the stone.

Mr. C. H. SMITH, Hon. Member, rose, thinking it but justice to the various inventors collectively, to say a few words with reference to the accuracy with which their artificial stone may be moulded to the required dimensions, particularly that produced by Mr. Ransome's process. He would remark upon it in comparison with terra cotta, of which so much has been said. Terra cotta was obliged to be moulded so much larger than it was intended to be when finished, in order to allow for shrinking, which it did surprisingly after having passed through the fire or furnace; in some cases the shrinkage amounted to twenty-five per cent. or three inches in a foot; this would not be of so much consequence if the material shrunk uniformly, but as some parts were mixed with a greater quantity of water than others, an irregular shrinkage occurred in drying, sometimes to the extent of two inches, sometimes three inches to the foot. This defect was particularly brought under his notice some years ago, when engaged upon the ornamental carving at Dorchester House, Park Lane, the Corinthian capitals in the hall and staircase were proposed to be of terra cotta (or china, which is somewhat similar). He suggested what was afterwards carried out, viz., that the bell of the capital should be formed of marble, and the ornament prepared in terra cotta, china, or porcelain ware, to represent white marble, to be fixed upon that. He recollected one Sunday morning, some thirty years ago, in the middle of service, the congregation at St. Pancras church were alarmed by a tremendous crash over their heads, a portion of the triangular ornament at the top of the spire, something like the crowning feature of the Choragic monument to Lysicrates, at Athens, fell through the leaded roof and rested upon the rafters of the ceiling; it shook some of the plaster down, but fortunately nothing else came into the body of the church. The terra cotta maker who prepared the work knew he was putting up defective material; he knew that it was cracked, and put the cracked part behind! He (Mr. Smith) had been frequently told, as a proof of the extreme durability of terra cotta, to look at the specimens in the British Museum, of the Augustine age, but he had never been told how many bad specimens had perished; they were all gone; the good ones only remained. He could point out several examples in London of decayed terra cotta. With respect to the cost of mouldings in terra cotta, or in any artificial stone, he did not believe they could be produced at the price for which they might be done in Portland stone; he had carved many thousand feet of enriched moulding at the Royal Exchange, not exceeding twelve inches in girth, for three shillings a foot run, which gave him a fair profit, while similar mouldings in artificial stone, at St. Pancras church, cost eight shillings and sixpence per foot run.

Mr. ALFRED WHITE, Visitor, said he had but a very few remarks to offer. It was a great pleasure to him to be called upon by the Committee to assist them in any chemical matters which might arise; but, really, so few features of that sort had presented themselves, that he was afraid the remarks he had to make would not be very valuable. He would, however, say a word or two as to the durability of these artificial stones. This was an extremely difficult subject, and one upon which a conclusion could not be arrived at so easily as some gentlemen present might suppose. He believed that it was partly his fault that the Report had not been presented before, and it was more especially delayed to endeavour to ascertain something during the frosts of the last winter with regard to the durability of these stones. Great care was taken, and great facilities were given to the Committee by Mr. Dines; but one winter, (and if they came to reflect they would not be astonished at it,) was not sufficient to come to any important conclusion as to the durability of stone. You must remember that many stones which had failed after a few years, had stood a winter or two extremely well; in fact, very little impression would be made by the frosts of one or two winters. These delays had certainly given the Committee an opportunity of trying some more experiments, but they had not led to any very important result as to the durability of stone. With respect to any particular solution or test which they could apply, diluted sulphuric acid would very likely test the durability of some stones, but he could see very clearly that many descriptions of stone which would be extremely durable, would not pass well through the test of sulphuric acid. For instance, a class of limestones which were extremely useful, and which were certainly very durable, (he meant the kind of stone of which Salisbury Cathedral was composed, and which existed to a very large extent in that district,) he believed would utterly fail under the test of sulphuric acid; and for this reason, that the durability of that stone depended partly on its containing a small proportion, (varying from five to fifteen per cent.) of sand, or silica. If they applied diluted sulphuric acid to that kind of stone, they would dissolve away the carbonate of lime, and leave the silica which protected the stone so beautifully from the atmosphere, unsupported, and it would fall down as sand. He did not think they could apply it to natural stone, and it certainly would not be fair to apply it to artificial stone. Sulphuric acid would act very differently on M. Coignet's and Mr. Ransome's compositions, and they would really gain no information by the application of such a test. It was a subject to which he had paid much attention since he had acted with the Committee, and was convinced that nothing but exposure for a series of years would give any valuable information as to the durability of stone. He should like to make a remark or two about Mr. Ransome's stone. It appeared to him that if properly prepared it would be a stone which would stand the atmosphere of almost any city or any place. He could not see how that stone was to be destroyed if prepared perfectly. He thought Mr. Ransome had not yet made his process perfect, but had many experiments to make. He was convinced that the strength of the solutions used in the preparation of the stone was a matter of the very greatest importance. He believed, from what he had seen of the specimens prepared for the Committee, that many of the failures had arisen from one or both of the solutions being made too strong. The stone must be so prepared that the chloride of calcium would penetrate to the centre of the block uniformly, and he was sure Mr. Ransome would admit that up to the present time he had not arrived at that state of perfection. He thought it would be extremely important if they would allow many of these specimens to be exposed for a year or two under the eye of the Institute. If these were examined from time to time, they would afford much valuable information. Architects must be very cautious how they employ artificial stone, and expose it to the atmosphere, and more especially in London. It will require a considerable number of experiments, and a great amount of experience, before they can arrive at anything like certain conclusions. With regard to the remarks which had been made about terra cotta, that was not a subject which came under the notice of the Committee, and therefore they paid no attention to it, but he could very well understand that terra cotta would vary extremely according to its composition, and the mode in which it was burned or baked. It came, when properly made, so near to perfect brick, that it appeared almost impossible for it to fail. Of course it was much more easy to ascertain the durability of a natural material than an artificial one. The natural material was exposed in quarries, and in sections, and that gave them an opportunity of observing the effect of exposure to the atmosphere, whereas time only would allow them to come to anything like a sound conclusion as to artificial stone.

Mr. Blashfield, Contributing Visitor, said that this was a subject which had interested him very much, and perhaps he might be allowed to say a few words upon it. It was one which had often engaged his attention in former years, especially in connection with concretes and cements. There was a house, he believed, in Park Street, which the late Marquis of Normandy lived in, and which was built of concrete blocks, formed of shingle, sand and Mulgrave cement, and designed by the late Mr. Atkinson The blocks had great sharpness, and there was really but very little the matter with the house. He always looked at it whenever he passed, and he regarded it as being the best specimen of that sort of work in London. It was suggested to him that he should make some of those blocks, and he set to work, and had some made out of an iron mould. The mould was two feet by two feet, and by putting in some iron plates he got ten or twelve different forms from the same mould. He tried several compositions, and in the first place used Roman cement, broken tiles, and coarse sand, but he found that was rather costly. He then took ballast and broken bricks from the brick-field, and certainly this was stronger and less costly. He mixed very hard broken bricks, or burrs reduced to a small size, about half an inch, with Roman cement and sand. He forgot now the exact measure, for he was speaking of work which was done five and twenty years ago. This composition was strong. Those experiments led him to apply to Mr. Petty, of Leghorn, for some Italian pozzolana, which he used with lime and sand, and with sand and Roman cement, and the concrete blocks so made became very hard. The blocks made of Roman cement, pozzolana, lime and sand were soon ready for use. Those made of lime, sand, and pozzolana were longer setting, but eventually became the strongest. To these combinations of Roman cement, sand and pozzolana, and lime, sand and pozzolana, he added pot-sherds such as Pliny relates the Romans mixed with their mortar, and he considered that increased toughness was obtained by this addition. He had a house built of blocks made of pot-sherds, sand, and Roman cement, at Northfleet, and Mr. Bevan, the banker, had four small alms-houses built in the same way with this same concrete. The trouble was very great in fitting the door-ways and sash-frames, and other matters; and in making the courses he took the trouble of having a drawing for each course, so that all the blocks were very carefully arranged for bonding. Altogether the matter was so troublesome, that upon going into it with an architect, he found that it would be much dearer than building in the ordinary way. He had one of the pozzolana concrete blocks kept under water for two years, and its hardness was very great. The late Mr. Walker, the engineer, showed him specimens of Dutch terras, which had been used in the Woolwich dockyard in the reign of George the Third, and which were of very great hardness—in fact, he was told that in breaking up the dock where it was used, the workmen were obliged to have resort to gunpowder. Messrs. Walker and Burgess were employed on the embankment in front of the New Houses of Parliament, with whom he had a long conversation on the subject of pozzolana. Mr. Walker used pozzolana, lime, and sand for the concrete and mortar in that work, and he knew it to be a most excellent material, and from enquiries which he had made, he believed this mortar cost about £1. a ton. Two measures of sand, one of pozzolana, and one of lime, were considered good proportions to make a very excellent concrete. Mr. Lee used a very fine concrete made of Portland cement, Portland stone chippings, sand, and shingle, in great blocks, 16 feet and more cube, made in moulds, for the breakwater at Dover. He made some experiments for this work with the Lancashire terras, mixed with broken tiles and sand; but it was not deemed equal in hardness to the Portland cement concrete blocks, and it was abandoned, though Sir John Rennie gave it some very fair tests in some of his works. With regard to the manufacture of terra cotta, he could not say that he was a very old manufacturer, for he had only begun it about the year 1851. He had had the acquaintance of the late Mr. Herbert Minton for some years before that, and when that gentleman began making buttons, he suggested to him the idea of making tesserae for pavements, which he had tried to make from marble and other substances. The knowledge of pottery he obtained through Mr. Minton's experiments upon pavements, and other works, showed him that what was called "terra cotta" was an imperfect thing for the atmosphere of London, and that terra cotta, as generally used, was nothing more than baked clay with a little sand, and a few broken potsherds, and that to make a hard material like Mr. Minton's tiles, it was necessary to use other matters. He had tried to make something of that kind, and had at the commencement made after great labour and expenditure, some of the mistakes which Mr. Smith had described. He had sometimes made things two inches longer than others, with the same quantity of water, clay, and sand, and burnt in the same kiln, and it was only in experiments carried on during several years, that he had been able to arrive at any approximation to perfection. Since Christmas he had made at least 4,000 balusters from patterns, and about 400 keystones of different sizes, and he would venture to say that these had not varied a quarter of an inch. Part of these works had been executed for a very large public building, and an architect had visited the works and given a certificate for every payment which he had received, after a careful inspection of the terra cotta. He did not say that everything was perfect, but on a very large work, comprising some 10,000 pieces, his loss had not been five per cent.

Mr. T. HAYTER LEWIS, Fellow, was most anxious that the meeting should not separate without giving the due meed of honour to Mr. Dines, Mr. White, Mr. Burnell, and Mr. Papworth for the very great kindness and attention which they had shown throughout the whole course of the experiments. Mr. Hansard's name had been brought forward by Professor Kerr in his original motion, and therefore he (Mr. Lewis) could not include him. Nevertheless, he was bound to say that Mr. Hansard had been most unwearied in his attention to the subject, and had devoted a vast amount of time to it, and the Institute would be wanting in gratitude and respect both to him and to the other gentlemen whom he had named, and to themselves, if they omitted to vote the resolution which he had proposed. At that late period of the meeting he would say no more as to the result of the experiments than to call the attention of the meeting to the results of the crushing of the cylinders of stone and marble then exhibited. It would be seen that the whole of them had crushed in the direction of the length, whichever way was the direction of the bed; and these results agreed very strikingly with the results of the experiments which had been made by Mr. Hodgkinson on the breaking of iron columns, and which had been published some few years ago in the "Transactions of the Society of Civil Engineers." When iron was first brought into use, they used to have the most horrible forms of columns possible, swelled out in the centre in a sort of fish-bellied form, because it was considered that columns would break by bending, and that they needed, therefore, to be strengthened in the middle. Within very narrow limits this might possibly be the case, but not with the size of which columns were usually made; and as nothing more horrible could scarcely be conceived than the above form, it was satisfactory to find from Mr. Hodgkinson's experiments that it was not the best for strength. The experiments now reported on by the Committee proved this also in a very striking way. It was a most important point, and clearly proved that the old form of cylinders were practically the strongest as well as the most graceful. He would now propose a vote of thanks to the gentlemen whom he had mentioned.

ON CERTAIN EARLY ROMANESQUE BUILDINGS IN SWITZERLAND AND THE NEIGHBOURING COUNTRIES.

By EDWARD A. FREEMAN, Hon. Member.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, June 13th, 1864.

MY object in the present paper, as in a lecture on a kindred subject which I gave last year before the Architectural and Historical Society at Oxford, is rather to stimulate curiosity than to gratify it. I find myself on the edge of a very large subject, of which I have advanced very little beyond the edge. It is by no means likely that I shall myself ever go very much further; but I flatter myself that various circumstances have put it in my power to give some useful hints to those who may be inclined to follow up the subject more minutely. This is what I attempted to do last year at Oxford with regard to the architecture of Switzerland generally. I recommended it as a branch of architectural study which presented much that was attractive in many ways, but which had hitherto been almost wholly neglected. I pointed out the only way in which the subject could be successfully studied, and I started several questions as having occurred to me which I by no means pretended to answer myself. I believe that this is the best service which can be done by one who opens what is practically a new subject. It is dangerous to dogmatize on a first sight of anything; but to an observer who has his eyes open the first sight of anything is sure to suggest subjects of inquiry, which, whatever may be the results finally reached, cannot fail to be useful both to himself and to others. What I did last year at Oxford with regard to the general subject of the ancient architecture of the countries forming the present Swiss Confederation, I propose to do now with regard to one particular branch of it which specially attracted me on a second visit this year. This is the early Romanesque architecture of Switzerland, looked at as a contribution to the general study of comparative architecture. I propose to mention several buildings which greatly struck me, but I do not profess to give a minute antiquarian account of any one of them. I propose to point out several lines of inquiry which they suggest, but I have to confess that, so far from having myself exhausted them, I have hardly entered upon any of them. I shall venture to mention a general conclusion to which such facts as I have observed seem to me to point; but I shall put it forth only as an idea floating in my own mind, ready to be confirmed or refuted by future inquiries, by no means as a decided conclusion which I am anxious to thrust down the throats of others, or even as one which I am prepared dogmatically to defend.

The idea—for I can hardly venture to call it a conviction—which is thus suggested to me by what I have seen in several parts of Western Europe amounts to this. It strikes me that, before the later forms of Romanesque with which most of us are familiar, the Norman of England and Northern France, the peculiar Romanesque of Germany, the peculiar Romanesque of Aquitaine, and any other national or local varieties which any other observer may wish to establish, there was an earlier form of Romanesque spread generally over Western Europe, more directly imitated from Italian models, and differing less widely in different countries, than the varieties of Romanesque which followed it. It strikes me further, that in the course of the eleventh and twelfth centuries, this common style was generally supplanted by local styles which each country developed for itself. Again, it would seem that this common style survived longer and attained a higher development in some countries than in others; that in some countries the later Romanesque of the district was developed out of it, while in others a later form of Romanesque violently supplanted it. It would follow then that in some countries we may expect to find buildings of this sort of some size and pretension, while in others we are driven to patch up our notices of the early style from small and rude fragments here and there. A large and highly-finished building of the twelfth century in one country may be the true congener, not of its contemporary large and highly-finished building elsewhere, but of some obscure little building in some out-of-the-way corner, which nothing but its poverty and obscurity has preserved from destruction.

This is then the view which I have been inclined to all along, and which what I have seen in Switzerland has gone far to strengthen, but I throw it out only as something to be tested or sifted either by myself or by anybody else. I would strongly recommend it as a subject to be fully worked out by some of those who have more time for such inquiries than I, that is, by some of those in whose historical researches architecture holds the first place. With me, I need hardly say, architecture is but a secondary pursuit, something more indeed than a mere amusement, but still a study quite subordinate to others. Above all, in Switzerland, where the political problems of the present and the past necessarily absorb almost every thought, where the present has grown out of the past instead of being substituted for it, where the life of old Greece, of mediæval Europe, and of our own times, all live together in such strange and wonderful harmony, it is only a very secondary care that the historical inquirer can afford to give to the architectural monuments of the country. In the land of bondage one turns to the contemplation of the ancient glories of Toulouse or Alby as a pleasing relief from the dreariness of the present; in the land of freedom one can hardly find time to examine a castle or a minster when one has a chance of beholding a Landesgemeinde. But I must give an emphatic warning to any one whom I may induce to enter on the subject. The study of architecture and the study of political history must go hand in hand. The student may determine at pleasure which he will make primary and which secondary, but if he wishes to understand either worthily, he must not be wholly ignorant of the other. A man who is wholly ignorant of history may doubtless both put together a building, and put together æsthetical theories about it, but he can know nothing of the real history of his art unless he studies it in connexion with other branches of history. Again, I do not hesitate to say that the man who studies general history without paying any regard to the history of architecture leaves out one important portion of his subject. The architecture of a country is as much a part of the national life of a people, and is therefore as much entitled to a place in its history, as its laws, its language, its military discipline, or its social habits. I do not say that all of these branches are of equal importance, but I do say that each of them is of some importance, and that he who leaves out any one of them, be it architecture or any other, leaves out an essential part of what he professes to learn. And I must repeat, what I have often said before in other forms, and what is of especial moment in everything which concerns the history of Switzerland, that he who would make himself master of architectural history, or of political history, or of any other branch of history, must, first of all, thoroughly emancipate himself from all bondage to the modern map. In studying any building or class of buildings, he must remember what were the political divisions of Europe at the time when those buildings were erected. It would be invidious to mention here the ludicrous blunders into which even really distinguished men have fallen through neglect of this caution. We must remember that mediæval architecture knows nothing of a France that touches the Rhine, that Romanesque architecture knows nothing of a France that touches the Alps or the Pyrenees. From forgetting this, when people find the national architecture of Germany, Burgundy, and Aquitaine within the limits of modern France, they either set it down as French, or else wonder at finding within France architecture which their own eyes tell them is not French. They forget that the lands of which I speak are French in no sense except in that of having been seized by France for the most part long after their principal buildings were built. Thus in Aquitaine, the Romanesque buildings are all purely national; in the Gothic period we find national and

French buildings side by side. So, when I speak of Switzerland in the heading of this paper, I use the word only for geographical convenience. In Romanesque times, and long afterwards, no such country or nation as Switzerland existed. The present Swiss Confederation consists of certain portions of the three kingdoms of Germany, Burgundy, and Italy, which have gradually joined themselves together at various times from the fourteenth century to the nineteenth. The Swiss nation is an artificial nation, a product of comparatively modern political circumstances. It is none the less truly or honourably a nation for being thus artificially formed; but this artificial and modern origin completely cuts Switzerland, as Switzerland, out of the architectural map. In the days of which we speak the Swiss name had not spread beyond a very small district of the Duchy of Swabia. There is therefore no such thing as Swiss architecture as far as we are concerned; the architecture with which we have to do is German, Burgundian, and Italian. It is then to the ancient Romanesque architecture of the border lands of the German, Burgundian, and Italian kingdoms that I would now call your attention, and to the light which that architecture throws on the probable existence of an early form of Romanesque common to Western Europe in general.

Of this question I may remark, in passing, that the questions which have been raised in our own country as to Norman, and what is called "Anglo-Saxon architecture," form a part. To the name "Anglo-Saxon" I have no sort of objection, if people only understand what they mean by it. I only quarrel with it as a purely chronological term. Some people by "Anglo-Saxon" simply mean "before 1066," and by "Norman" "after 1066." In this sense the name is of course absurd. But if what is meant is that there was in England an independent variety of the great Romanesque family, which grew up long before the Norman Conquest, and which was gradually supplanted by the Norman style, so that the earlier "Norman" and the later "Anglo-Saxon" buildings are contemporary, then the only objection to the name is that the word "Anglo-Saxon" is often used in such a foolish and confusing way that it is very likely to be misunderstood. I believe that there was such a style, a strictly native offshoot from the old Italian models, which gradually died out before the Norman in the course of the last half of the eleventh century, and which is now represented only by a few fragments here and there, some of them older than the year 1066, and some of them later. My present object is to show the probability that this native English style was only one branch of a more widely spread form of early Romanesque, which, both in England and elsewhere, gave way to later local forms, but which in some countries lasted longer and attained a higher development than is shown in any existing English example.

I have said that the question of the existence of an independent ante-Norman style in England, forms part of the greater question suggested by the German and Burgundian buildings which I would introduce to your notice this evening. But let me remark that one or two controversies which have sometimes been mixed up with the question of the existence of such a primitive style have really nothing to do with either. For instance, the question as to the date of Waltham Abbey has nothing to do with our subject. That controversy was confused by one or two people who chose to drag into it the misleading word "Saxon." But, as Waltham, whatever its date, is undoubtedly Norman in style, the two questions should have been kept quite distinct. I have seen no argument yet brought strong enough to overthrow the historical presumption that a large part of the present church of Waltham is the original work of King Harold. But any opinion on this matter either way does not directly affect our present subject. It may affect it indirectly, because, if Waltham be really work of the eleventh century, then the art of the eleventh century could not have been so rude as is sometimes taken for granted. But it has nothing directly to do with the question of style, because Waltham is pure Norman in style, and has nothing to do with the primitive buildings of which I am speaking. The only difficulty is that some people cannot understand the possibility of a "Norman" building before 1066, or of a

"Saxon" building after 1066. Yet we know from history that the style in which Edward the Confessor built Westminster Abbey was remarked as a new style,* and if Waltham, or any part of it, is really Harold's work, the great Earl did but imitate or forestall his sovereign in introducing the last improvements in art from a neighbouring country. On the other hand, there is historical evidence to show that some buildings in the "Anglo-Saxon" style, if we are so to call it, are later than the Norman Conquest. There is nothing wonderful in this; it is the common course of all transitions. The two styles exist for a while side by side; the earliest buildings in the new style are older than the latest buildings in the old style. The Norman nave of Peterborough is later than the advanced Transition of Canterbury, and than St. Hugh's Early Gothic at Lincoln. The same thing always happens in such cases; still more would it happen when the new style was introduced from without, mainly under the patronage of foreign conquerors. Small buildings in obscure places, the work of native founders and native builders, would continue to be built in the old national fashion, long after every cathedral and abbey and castle was built in the newly imported foreign style. There is then no difficulty in the erection of a Norman building in England before 1066, and, if we are to talk of "Anglo-Saxon" buildings at all, there is no difficulty in the erection of an "Anglo-Saxon" building after 1066. It is only the unlucky use of ethnological words as if they were chronological, which has led to any confusion about the matter.

I believe then that our primitive English or "Anglo-Saxon" style was an independent variety of Romanesque, which, in the course of the latter half of the eleventh century, gradually died out before the newly-imported Norman. I wish now to show the connexion between this primitive English Romanesque and the primitive Romanesque styles of other countries. Now we have a great disadvantage in England from the fact that no large building in the primitive style is preserved. We have to pick up our notions of it from small, and for the most part fragmentary, examples. It was in fact, as I believe, the small size of the native churches, rather than any actual inferiority in art, which made the Norman builders despise, destroy, and rebuild, every important church in England. The building of churches on an enormous scale, like Winchester, St. Albans, old St. Pauls, was a great fancy among the Norman builders of the eleventh century. It is a fact worth noticing that it is a custom which never spread into either Wales, Scotland, or Ireland. The strictly native churches in all those countries are all very small, and even those which were built under Norman or English influence never attain the size of the huge Norman minsters of which I speak. St. Davids, Glasgow, St. Patricks, are all churches, not of the first, but of the second order. At Cashel, the thirteenth century Cathedral is really very small; but it seems vast beside the original Irish Cathedral of the twelfth, which has now become a mere adjunct to it, and goes by the name of Cormacs Chapel. I wish specially to insist on this difference in size, because during the Romanesque times, size and richness seem to have gone in an inverse ratio to one another. The smallest buildings are commonly the richest; the largest are everywhere the plainest. Undoubtedly many small Romanesque churches are very plain, but it is not too much to say that no very large Romanesque churches are very rich. The examples of the most elaborate Romanesque ornament come mainly from very small churches, hardly ever from churches above the middle size. A small Romanesque cathedral is richer than a large one. and a parish church, if it pretends to elaborate architecture at all, is still richer than the small cathedral. This is not a mere question of date; the late Norman of Peterborough differs much from the early Norman of Winchester, but it is not a bit more richly ornamented. It is in fact a peculiarity inherent in the style; the larger a Romanesque building is, the better it can dispense with ornament. A church as big as St. Albans and as rich as Iffley would be intolerable.

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* One need hardly quote over again the familiar passages from William of Malmesbury and Matthew Paris.

I suspect then that it was the small size of the primitive English churches which, more than anything else, led to their almost complete destruction at the hands of the architects of the next period. In amount of ornament I know of no reason to suppose that they were inferior to their successors, though that ornament may well have been of a much ruder character. Indeed, the small remains which we still possess of our Old-English churches, together with the contemporary descriptions of larger buildings, seem to point to a certain barbaric richness as rather a characteristic of the style, in opposition to the usual plainness of the early Norman. Such a tower as Earls Barton, such a church as Bradford-on-Avon, evidently affected no small degree of enrichment according to the taste of the times. But on the other hand, no doubt many buildings were built in a very plain style then as well as at other times. But we must carefully guard against the notion that sculpture, all such sculpture as requires the chisel, was unknown till late in the twelfth century. This idea is grounded solely on a misconception of a passage in Gervase,* who simply says that, in Conrad's choir at Canterbury, the chisel was not used on the piers and arches. Of course it was not; the capitals of massive Norman piers, and the surface mouldings of early Norman arches, seldom needed it; but that in no way proves that the chisel was not familiarly in use long before the time of William of Sens. And we must equally guard against another notion, that all or most of our early churches were built of wood. No doubt churches and other buildings were sometimes built of wood at all times; no doubt in early times the practice was more common than afterwards; it is even probable that some features of the primitive Romanesque style, as it appeared in England, were actually borrowed from imitation of wooden structures; but all this in no way proves that timber was the one universal, or even general, material in use before the Norman conquest. As a general rule, material depends rather upon place than upon time. Where good stone was to be had, churches, and even houses, would be built of stone for whole centuries during which wood was used in less favoured districts. The wooden theory is right in the teeth of the numerous contemporary descriptions of early stone churches, and the evidence brought in support of it commonly tends, when examined, to refute the theory. When King Cnut dates a charter—if the charter be genuine—from "the wooden church at Glastonbury," † the description proves one of two things: either there was a stone church as well, from which the wooden church needed to be distinguished, or else a wooden church struck the King or his chaplain as something so remarkable that they thought it necessary to distinguish it by an epithet expressive of its singularity.

I am thus gradually clearing the path by which I reach my main subject, the light thrown by certain Swabian and Burgundian buildings—I use the geographical language of the age in which they were built—upon the general question of a primitive Romanesque style. Almost our last step will be briefly to sum up the characteristics of that primitive style, as far as we can ascertain them from the few and rude examples left in England, in order to see how far they agree with the more finished structures of the same class to be found in foreign countries. Every one who has at all studied these controversies knows well the sort of details which are commonly appealed to as signs of "Anglo-Saxon" style or date—the mid-wall shafts, the baluster-shafts, the double splay, the lack of buttresses, the triangular-headed openings, the pilaster-strips perpendicular and horizontal. We may perhaps add some odd forms of mouldings—if they deserve the name—such as may be seen in some of the chancel and tower-arches of the style, and some rude pillars, very unlike Norman, and clearly clumsy imitations of Roman work, such as may be seen at Repton.* The character of the piers may be less certain; probably both the massive square pier and the no less massive round pier were in use. The massive round pier is so distinctive of the Norman of England as compared with that of Normandy, and it is found in English Norman of so early a date, that it is difficult to believe that it is not a national peculiarity of earlier times, which the Norman builders simply continued. But the square pier was also in use, especially when Roman remains were made available. We see this at Brixworth; we see it also at St. Albans, for St. Albans, intensely Norman as it is in its vast size, must, in some points of detail, be looked on as an example of the ante-Norman style. It is said that the design of rebuilding the church was entertained before the Conquest, that more than one Abbot made large accumulations of materials for the purpose; † it is clear also that in some points St. Albans forsakes the ordinary Norman type, and approaches to the buildings of earlier times. The natural inference that what Paul and his successors did was to carry out, on the vaster scale which suited their Norman ideas, the plans of their English predecessors. The square piers at St. Albans, as at Brixworth, were the necessary result of the use of Roman materials. Probably both forms, and indeed the columnar pier also, were used as taste or convenience dictated.

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* The words of Gervase (X Scriptt. 1302) are "Ibi [in the old choir] arcus et cætera omnia plana, utpote sculpta secure et non scisello, hic [in the new choir] in omnibus fere sculptura idonea." He is speaking of the piers and arches only, and he does not at all imply that the chisel was a new invention.

† See Kemble, Codex Dipl. iv. 41. "Promulgata in ligneâ basilicâ." The charter is marked by Kemble as doubtful, but the "lignea basilica" is one of those incidental local points for which a forged charter is as good evidence as a genuine one.

But, after all, as every one familiar with these early buildings knows, the thing which really distinguishes them from their successors is the peculiar type of tower employed. Every one knows the type of the "Anglo-Saxon" tower; leaving all technical details aside, how utterly different it is from the Norman tower in its whole feeling and character. The Norman tower, low, massive, never so much in place as in the middle of a church; the "Anglo-Saxon," tall, hard, square, unrelieved even by the shallow Norman buttress, suited only for a position, like the west end, which displays its full height. Years ago, when I wrote my "History of Architecture," I pointed out what I believed then, and what I believe still, to be the origin of the difference.‡ The Norman tower, never thoroughly at home but in the centre, is the direct successor of the dome. A careful study of Aquitanian, French, and German churches will easily show how the square central tower was gradually developed out of the earlier cupola. The true Norman tower, just like the cupola, is not a campanile, but essentially a lantern to the interior. But the "Anglo-Saxon" tower is essentially a bell-tower; it is the lawful offspring of the old Italian campanile, whose general character it reproduces in a rude shape. The height, the squareness, the peculiar character of the windows, all come from that source. Again, besides this manifest derivation from Italy, the analogy between our old English towers and many of those in Rhenish Germany has often been remarked. More than one architectural critic has pointed out the strong likeness between the tower of Sompting and those of St. Castor at Coblenz. How then comes this likeness? Simply because all three are vestiges of the one primitive Romanesque, common to all these countries before the distinctive local forms of Norman and Aquitanian Romanesque were developed.

Now I know that I shall here be met with an objection which is, in truth, nothing better than a fallacy. I shall be told that all these German and Italian buildings are of much later date than is commonly thought, that they are of the twelfth century, or, at the earliest, of the eleventh, that they can therefore prove nothing as to any common primitive style; that any notions about Bishop Wilfrith or anybody else reproducing Italian towers or style in the seventh or eighth centuries must be the merest dream. Now I will not dispute about the dates of particular buildings; we have not time for it this evening, and I have not the materials at hand for such a controversy. Let us grant then that the great mass of the existing Italian and German buildings date, like the mass of those of England and France, from the eleventh and twelfth centuries. By admitting this, our position is in no way shaken. We must remember the difference between style and mere date; we must remember that an enlarged study of architecture is not satisfied with fixing with antiquarian precision the exact year in which such a church or castle was built, but it goes on to deduce from those antiquarian facts the true history of the building art. Let us grant, if any one pleases, that all the existing remains, Italian, English, or German, are all of them as late as the eleventh century, and our case would stand very nearly where it stood before. The resemblance between the Italian and the English buildings is far too close to be merely accidental, and it is a resemblance which cannot possibly have begun in the eleventh century. It has been shown by evidence that the primitive towers at Lincoln are later than the Norman Conquest,* and this fact, strange to say, has been brought forward to prove that there was no such thing as an independent English style before the Conquest. Of course what it proves is the exact contrary; no more convincing argument could have been asked for to prove the existence of such an independent style. These Lincoln towers are not Norman; they are, in their very form and outline, a protest against Norman innovations; but still less are they the first-fruits of an imitation of Italian models. They are evidently the last efforts of a decaying style, a style banished from minsters and palaces to obscure parish churches, and which even there the Norman influence was beginning to overtake. They would of themselves be almost enough to show that the days when England borrowed its models directly from Italy were then long past. The dates of particular Italian and English buildings do not affect the question. Granting that they are all as late as any one chooses to put them, the mere fact of their connexion, which is too clear to be denied, shows that they are, in both countries, only the representatives of earlier buildings of the same class. The original models were Italian, but the style took root in England, and got developed or corrupted for itself, while in Italy also it grew after a somewhat different fashion. Granting, for argument's sake, that there is no tower in either country of an earlier date than the eleventh century, the fact, if fact it be, in no way proves that English architects of the seventh or eighth centuries did not imitate contemporary Italian models, nor that the existing towers of England and Italy are not respectively later representatives of the buildings which set and followed the model in those earlier times.

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* I mean not only the pillars of the crypt, but the large strange pillars, which have been moved from their places and are now kept under the tower.

† Vitæ xxiii Abbatum, pp. 40, 49 (Wats) The oddness of the story is rather in favour of its authenticity, cf. Buckler's St. Albans, 128, 134.

‡ History of Architecture, p. 189, 212.

This sort of reasoning, indeed, is one which has introduced confusion into more points than one in architectural history. It is found out that certain specimens of a class are later than has commonly been thought. A discovery of this kind is a good service to truth, as popular belief always tends to make things out to be older than they really are. But the discoverer sometimes leaps to the conclusion that, because some specimens are later than has been commonly thought, therefore the whole class must be later. Now all that his discovery really entitles him to say is that a certain custom was kept on later than has generally been thought; he has proved nothing at all as to the time of its origin. Take for instance the Irish round towers. It was a great advance to set them free from all the ridiculous speculations which had been poured forth about them, and to show that, to whatever incidental uses they may have been put, their origin is Christian, and their primary use that of bell-towers. It was another great step to show how late the custom of building this kind of tower prevailed in Ireland, to show that some of them are as late as the twelfth, and I believe even the thirteenth, century. But this last discovery will not justify any one in placing the round towers, as a class, at any such late date. Because a highly finished round tower, which must have had many ruder forerunners, is rightly placed in the twelfth century, it does not follow that one of those ruder forerunners may not be equally rightly placed in the seventh century. Giraldus, writing at the end of the twelfth century, speaks of the round towers in language evidently implying that the building of such towers was an ancient national custom which had prevailed for ages.* Now his language is in no way inconsistent with the belief that some of the round towers are of his own age, or even of a later age, but it distinctly proves that there were also round towers belonging to an age far earlier. So with another curious, but much less known, class of towers, the military church towers of South Wales. From their general air and character, any one would, at the first glance, set them down as of early date, not later perhaps than the thirteenth century. But a little examination of their details easily shows that most of them are of quite late date, some perhaps even of the sixteenth century. But it would be a great mistake to set down the type, as a type, as one of late origin. Though the mass of the existing examples are actually late, yet here and there we find early examples of the same general character, quite enough to show that the type is essentially an early one, and that the late examples simply prove that a form which suited the ideas and the habits of the districts remained in use for some centuries with little material change. These two cases, of the Irish and of the Welsh towers, thus clearly illustrate my position, that buildings of a later date may preserve and represent to us the architecture of a much earlier period, even granting, what I am by no means inclined to admit, that no actual examples of that earlier period remain. And I believe that both the Irish and the Welsh towers are connected with our subject by a closer tie than that of analogy. The Welsh towers, especially the earlier ones, often recall the general effect of the primitive English type; I suspect that they are in fact an adaptation of it to the particular purpose which they were meant to serve, that is, to provide a building which should serve at once as a bell-tower and as a fortress. And notwithstanding the peculiarity of the shape of the Irish towers, yet, tall, high, unbuttressed, commonly detached, as they are, there is a certain kindred feeling between them and the other classes of which I have been speaking, whether in England, Italy, or anywhere else.

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* Parker's edition of Rickman, p. 103.

I have thus set forth my general position, and I have endeavoured to avoid misconception by pointing out certain questions with which it is, and certain others with which it is not, connected. I now come, rather late as it seems, to my main subject, the light thrown on the probable existence of such a common primitive Romanesque as I suppose by the buildings which I have lately visited in Switzerland and elsewhere.

I will begin with a building which, I think, almost proves my point, that most stately tower of the minster at Schaffhausen. A large church of the eleventh century, of the sternest and plainest Romanesque, is finished with a single side tower near the east end, which it is impossible to look at without at once feeling its close connexion with the Italian campaniles on the one side and with our own primitive towers on the other. Any one familiar with that class of towers in England of which Earls Barton is the grandest specimen will at once feel that here is the realization of the idea which such a tower as Earls Barton aims at. Schaffhausen is, in a comparatively finished shape, what Earls Barton makes a rude attempt at being. One cannot doubt that the tower of Schaffhausen shows us what our Anglo-Saxon towers might have grown into, if the style had been allowed free and full development, perhaps what they actually did grow into in those greater cathedrals and abbeys of which the Norman rebuilders have swept away all traces. The resemblance is less in detail than in general feeling; Schaffhausen has nothing of the "stone-carpentry" of Earls Barton; much of its detail might be Norman, but the tower, as a tower, is utterly unlike any Norman design. And yet in one most important detail this Swabian tower approaches closely to the primitive towers of England. I mean in the *mid-wall* shafts of the belfry windows, one of the features most characteristic of the "Anglo-Saxon" type of tower, and one of those which are most indisputably borrowed from an Italian source. The balusters of Earls Barton, an English feature which, as St. Albans and Tewkesbury show, survived the Conquest, appear also at Schaffhausen, but they are not extensively employed, and they appear only in a very mitigated form. They are clearly not a necessary feature of the style; if not a mere piece of "stone-carpentry," they are such a bungling imitation of the classical entasis that they are not likely to be found except at a distance from the original models. Even in England they are by no means universal; for instance, they do not appear in the primitive towers of Lincoln. But if there be a primitive Romanesque style, the mid-wall shaft is undoubtedly one of the surest features of it. We find it in places at a great distance from one another, and in a great variety of forms and uses, the peculiar type familiar to us in England being of course only a very rude shape of it. Its origin is doubtless to be found in the shaft supporting the entablature, the arch again resting on that. It thus easily runs into another form, the coupled shafts so common in the Aquitanian cloisters, and indeed in cloisters elsewhere, and in whose fully developed form it is easy to recognize a Saracenic influence. The midwall shafts at Schaffhausen, which are seen, not only in the belfry windows, but in the cloister and in some other parts of the monastic buildings, assume various shapes, some single, some coupled, but all having a family likeness, and all reminding an English antiquary of much that he is used to at home.

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* Giraldus tells the story of the city which was swallowed by a lake, and adds, "Hujus autem eventûs argumentum non est improbabile, quod piscatores aquæ illius *turres ecclesiasticas, quas more patriæ arctæ sunt et altæ necnon et rotundæ*, sub undis manifestè sereno tempore conspiciunt."—Topographia Hiberniæ, ii. 9. There could not be a better description of an Irish round tower, and the passage most conveniently upsets two opposite errors at once.

The upper part of this tower, that is the gables and the spire, is evidently modern, or has at least been greatly tampered with, so I cannot warrant it as giving the original finish with absolute certainty. But it is probable that it fairly represents its general effect, one shared with it by a great number of German towers. It is in fact the form which we all know so well at Sompting, and which is also well known as a genuine German form, so modified as to take away a good deal of its excessive and perhaps unpleasing heaviness.

I assume the connexion of this tower both with the Italian and the English towers as something too palpable to be disputed. But I wish specially to point out the way in which this type of tower influenced German architecture long after the Romanesque style had altogether died out. The tall, hard, square, unbuttressed tower remained common for ages after every detail had utterly changed. I select out of many the tower of St. Stephen's church at Constanz. The general effect of this tower is singularly like that of Schaffhausen with some increase of lightness. But no part of it can be earlier than the thirteenth century, and the upper part—though the finish has been tampered with here also—exhibits a rather rich form of fully developed Gothic.

Now with this let us compare two other towers, both in the canton of Wallis, at the other end of Switzerland from Schaffhausen. These are the towers of the Abbey of St. Maurice and of the lower Cathedral of Sion or Sitten. In looking at these we at once recognize a certain analogy to Schaffhausen and its congeners, but the resemblance is fainter, the difference from ordinary Romanesque is much less marked. Still, I think, both their outline and their details justify us in looking on them as examples of our primitive style, though of the primitive style dying away and being gradually supplanted by other forms. The details of these towers differ less from ordinary Romanesque than those at Schaffhausen, and the pilaster buttresses at once remind us of the familiar Norman of our own country. Still we feel that they differ essentially from any Norman tower, and that, in every point of difference, they approximate to the so-called "Anglo-Saxon" type. The work at St. Maurice is ruder, and probably earlier, than that at Sion,* but both have the midwall shaft, or something having the same effect; the windows of both are quite different from any Norman windows. The height, too, and the position, both single western towers of large towers, have far more in common with the primitive than with the Norman type. They are palpable descendants of the campanile, and not of the cupola. The campanile, originally detached, is at Schaffhausen semi-detached; it does join on to the church, and yet it stands almost distinct from it. At Sion and St. Maurice, as in our own churches, it has taken up its common English position at the west end.

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* Roman shafts and other fragments are used up again in a very singular way.

I do not know of any evidence for the date of the tower at Sion. For that of St. Maurice, M. Blavignac, whose work,[*] though most dangerous as a guide, still preserves a good many useful dates and facts, gives 1014 as the date when the church was re-built by the last Rudolf, King of Burgundy, after the deliverance of the country from the Saracens. But the famous Peter of Savoy in the thirteenth century is also said to have re-built or done something to the tower. No one can suppose that he built the tower itself; what he did was doubtless to add the spire, such as it is. And this reminds me of a curious fact, though not immediately connected with my subject. The cantons of Vaud and Wallis are full of broach-spires, making one almost fancy oneself in Northamptonshire. Count Peter plays an important part in English as well as in Savoyard history. Had he any hand in these spires, and are they due to any employment of English architects, or to any imitation of English forms ?

These three towers are all of them attached to churches of considerable size, and they exhibit the type in a degree of finish quite unknown in England. It is well that I am able to quote another, very small and unornamented, which forms as necessary a link in the chain as any of them. This is the little church of All Saints at Sion, about half way up the hill of Valeria, the rocky height crowned by the elder cathedral. The tower, a side tower, tall, thin, unbuttressed, covered with a low stone roof, with most distinct mid-wall shafts to its windows, must be felt by every one to be an example of the primitive style, nearly allied to the examples in our own country. But the general effect of the church calls to mind not an English but an Irish building. No one who has been at Cashel will fail to recognize in this little church a plainer and ruder congener of Cormacs chapel, the original cathedral on that rock which suggests so unavoidable a parallel to Valeria. Cormacs chapel, built in 1134, is very rich, and, in mere style, is Norman; this church at Sion, probably much earlier,[†] is very plain; it has Norman-like pilasters, but the windows have the double splay like our "Anglo-Saxon" examples. But All Saints at Sion and Cormacs chapel at Cashel have much in common, notwithstanding their wide difference in point of ornament. Had All Saints a second tower on the other side—a grouping much more common in Switzerland than in England—the outline of the two would be the same, except that Cormac has a more distinctly marked choir. As it is, they agree in one most extraordinary feature. Instead of an apse, in a position where even an Irish architect might have been expected to put one, a small square projection at the east end contains the altar. At Sion, where the east end of the church overhangs part of the rock, this projection is corbelled off, producing as strange an effect as may be.

I do not suppose that this little church was ever the cathedral of Sion, because no doubt the principal church always occupied the top of the hill, and because a small part of the actual upper cathedral appears to be of extremely early date. Otherwise it reminds one of that class of buildings of which Cormac's chapel is simply the chief, namely those early churches which in Ireland and Scotland seem to have formed the original cathedrals, and which sometimes remain side by side with the later and larger churches which have supplanted them. Such is the church of St. Regulus at St. Andrews, still standing beside the ruined metropolitan church of Scotland, and such seems to have been the church out of which by successive additions and changes, grew the present cathedral of Dunblane. Unluckily I have no drawing of either; I saw St. Regulus when it was too cold to draw anything; but I remember that the tower struck me as kindred with the Anglo-Saxon towers of England. Dunblane I drew and described at length; but I sent my description and drawings to the Meeting of the Archæological Institute at Edinburgh; there I presume that some cateran from the hills pounced upon them, as I never saw them again.

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[*] Histoire de l'Architecture Sacrée du quatrième au dixième Siècles dans les Anciens Evèchés de Genève, Lausanne, et Sion. Paris, 1853.

[†] I have no evidence for the date of this church. Father Furrer, the venerable historian of the Canton of Wallis, whose acquaintance I had the honour of making when at Sion, told me, to my utter amazement, that it was built in the fourteenth century. To prove this he showed me a charter of a certain Count of Biandrate, who endows a chantry in this church, which his father, "aut construxit aut ædificavit aut *ædificare intendit*." It is clear that this intention of rebuilding was given up: but the west door seems to have been then inserted, and much may have been done in the way of furniture and the like.

Now somebody will perhaps say that the points in which these towers agree are simply Swiss local peculiarities, that their resemblance to English buildings is accidental or imaginary, or, any one who is inclined to be imaginative may attribute the connexion to the agency of English and Irish missionaries, St. Gall, St. Columban, St. Boniface, and their followers. But I must remind you that, when these towers were built, there was no such country as Switzerland. Schaffhausen and St. Maurice are a good way apart, and still speak different languages. But when these towers were probably built, they were parts of two utterly distinct kingdoms, Schaffhausen of Germany, St. Maurice of Burgundy. Even if anybody chooses to place the towers after the union of the German and Burgundian crowns, though both cities would acknowledge the Emperor as their over-lord, they would still be under different immediate governments, and their inhabitants would be practically as much foreigners to one another as to Englishmen or Castilians. Again, the likeness between the Swabian and the Burgundian tower is by no means so clearly marked as the likeness between either of them and their English fellows. Surely such a likeness is not the result either of accident or of direct derivation, but the result of a common origin, of an independent derivation from models common to all. And my case will become stronger when I point out another group of towers in a part of the world far away from all that I have mentioned, presenting the same essential features as those of which I have spoken in England, Burgundy, and Swabia. Such a group may be found in the heart of the Pyrenees, in the neighbourhood of Bagnères de Luchon. The chief of these is the church of St. Aventin, one of the most remarkable buildings I know, and one which evidently set the fashion for its smaller neighbours. It is a nearly untouched Romanesque building, very plain, and apparently early. But I can only guess at its date from the following fact. A splendid doorway, such as in England would be of the twelfth century, and which, even in Aquitaine, we can hardly put earlier than the latter part of the eleventh, is a manifest insertion in earlier work. The church has two towers, western and central; both have distinct mid-wall shafts; both—even the central tower, so far as a central tower can—have the same hard, square outline as the others of which I have been speaking. Some of the minutest details, both in this and in other neighbouring churches, have the most singular likeness to details at St. Maurice, while in other points we can, as we should expect, recognize an independent local character. The type of St. Aventin, especially in the mid-wall shafts, is followed in several of the neighbouring village churches, and in the more distant tower of Arreau. As far as I could see, it is not spread over any large part of Aquitaine, but it is dangerous to speak positively on such a point, as it is naturally in obscure and out-of-the-way places that we are most likely to meet with examples of the primitive style of which I speak.

I have mentioned this group of Pyrenæan churches to show in what distant corners we meet with examples of this style, and how close is the resemblance between them. It is impossible to believe that

English, Swabian, Burgundian, and Aquitanian architects borrowed from one another. The long connexion between England and Aquitaine will prove nothing, because it did not begin till the second half of the twelfth century, when the later forms of Romanesque were fully established in both countries. Architectural fragments of this sort may be likened to the isolated fragments of nations which we come across in ethnological studies. These traces here and there of an earlier style which once overspread all Western Europe are analogous to those traces of an ante-Aryan race which scientific men discover in the same sort of solitary groups in various corners of the European continent. No explanation can satisfactorily account for either, except that both are fragments of something which, in remote times, stretched over the whole intervening space.

I have hitherto spoken mainly of towers, because it is in the towers that the characteristics of the primitive Romanesque, and the likeness between the examples of the style in very remote countries, are both most strongly marked. Of Romanesque towers not belonging to the primitive style I noticed but few. There is one at the small church of St. Mary, near the minster at Freiburg, where the windows are of ordinary later Romanesque, quite different from the mid-wall shafts of our other examples. But, though towers are the features which supply our best evidence, I must not wholly omit all mention of the other parts of the churches. I say the churches, because of civil and military architecture my subject allows me but little to say. I think however that part of the Bishop's Palace at Chur, to which a very early date is assigned, may be fairly set down as an example of our style. If my memory does not fail me, there are also windows with mid-wall shafts in the building called John of Gaunt's stable at Lincoln, a building which, I believe, does not owe its name to the renowned Duke of Lancaster, but to a much earlier family of the name of Gaunt.* If this be so, this house at Lincoln would be one of the latest examples of the primitive style, being no doubt contemporary with many fully developed Norman buildings.

But I must return to Swabian and Burgundian churches. Am I justified in setting down a tendency to omit the apse as a characteristic of our primitive style? No doubt many, probably most, churches of that date had the apse; the remarkable thing is that any should be without it. Now I need not say that, while the presence of the apse is, though not the invariable rule, yet most certainly the rule, in Continental architecture, its absence is even more thoroughly the rule in British architecture. The apse is rare in England, and, as far as I know, absolutely unknown in Ireland. This rarity or absence of the apse in the British isles has been attributed to an early primitive tradition, handed down from what we may call ante-basilican times. In the Norman period the insular tradition partly gave way; the large churches were commonly apsidal, while the apse was commonly absent from the smaller ones. But afterwards the tradition re-asserted itself, and brought about that singular peculiarity of our national architecture, the absence of apses from a large majority of our Gothic minsters. Now it is certainly remarkable that several of the churches of which I am now speaking are also without apses. I thought last year that it was a Swabian peculiarity, and certainly most of my instances are Swabian; but it cannot be exclusively Swabian, as we have already had a Burgundian instance in the church of All Saints at Sion. Now this very same square recess for the high altar, so strange a substitute for an apse, which we have seen at Cashel and at Sion, is found also, of course in an enlarged form, in the Cathedral of Chur, a church which, as being of decidedly transitional character, cannot be earlier than the latter half of the twelfth century. The apse again is absent at Schaffhausen; I am not absolutely certain that it ever existed at Romainmotier; it is absent from the two minsters at Zürich, buildings of later Romanesque date, and even from some fully developed Gothic churches like Romont. Undoubtedly, as I shall presently have to mention, the apse is found in several very remarkable churches, which we may certainly set down as examples of the primitive style. But the wonder is, not that it should be found in some examples, but that it should be absent from any.

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* See Matthew Paris, a. 1241, p. 572 (Wats). The site of the minster was bought of "M. de Gaunt," a follower of the Conqueror, doubtless a Fleming by birth.

I have mentioned Romainmotier. Of this church and Schaffhausen I must speak a little more at length, as exhibiting early Romanesque work in two different forms, and possibly at two distant dates. Romainmotier is one of the most extraordinary churches in Christendom. I must have some better authority than M. Blavignac * for assigning the existing building to the year 753; still I may say that the eighth century is a more likely date than any date afterwards, till late in the tenth. One may imagine art advancing under the rule of Pippin and the Great Charles; we can imagine it again advancing under the great Emperors who reigned from the first Otto onwards; we can hardly fancy it making any great strides in the time which intervened between them. Constant shiftings and divisions of the Empire and its attached kingdoms, constant invasions of Northmen, Saracens, and Hungarians, produced much the same effect in Germany, Italy, and Gaul, as the Danish invasions did in our own island. We may well believe that in England the quite early buildings, those for instance which were reared by Wilfrith and Benedict Biscop † in direct imitation of Roman models, surpassed anything which followed them down to the days of Cnut, or at any rate to those of Eadgar. Thus, though I by no means accept the early date of Romainmotier till I have more distinct evidence set before me, I by no means cast it aside as something absurd in itself. The church, whatever its exact age, is worthy of most attentive study, as we perhaps nowhere find so large an example of early Romanesque so little altered; and it is the more remarkable because there is Romanesque work of two palpably different dates—one blocking up the other—though it is not easy to make out any difference in style between them. The church is a cross church of the ordinary plan, with a central tower, to which is added a very large chapel, or whatever it is to be called, to the west of the nave, reminding us of the western additions to St. Woolos at Newport in Monmouthshire and to Llantwit Major in Glamorgan. Looked at as a church of the primitive style, the most remarkable thing about it is its having only a single central tower, of the massive proportions of those towers which are the natural successors of the central cupola. St. Aventin, it will be remembered, has a central tower, but it has also a western tower, of something like the usual proportion. I think no one who looks at the outside of Romainmotier can doubt that we have here a genuine example of a primitive Romanesque minster, the sort of ideal which such a church as Stanton Lacy would have realized if it could. The inside may be more doubtful; yet, unless we resort to some very improbable conjectures, we shall be led to believe that the greater part of the building—allowing of course for some palpable additions and alterations—belongs to the early date. The western chapel, which must be a little later in actual age, looks the earliest—that is to say, it is the plainest; but, as I before said, I am by no means convinced that greater plainness is necessarily a sign of greater antiquity. In the western chapel the piers are quite plain and square; in the nave they are round with square abaci, the angles being cut off in a rude way. In the eastern limb is one of the strangest piers I ever saw; a thin rectangular pier, almost reminding one of some of our mullion-shaped Perpendicular pillars, with a half-column, as it were, squeezed up against it. The capital of the half-column is a rude attempt at rich, perhaps Corinthian, foliage.

Romainmotier then is specially valuable as showing us what the interior of a large early

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* Page 78.

† "Benedictus, oceano transmisso, Gallias petens, cæmentarios qui *lapideam* sibi ecclesiam *juxta Romanorum, quem semper amabat, morem* facerent, postulavit, accepit, attulit."—Beda vita Bened. 5. So Gervase (X Scriptt. 1299) speaks of the old church of Canterbury as "opere Romanorum constructam."

Romanesque church was. This is the branch of the subject on which our examples, especially our English examples, afford us the least information. I think we may fairly take the external ornaments of Romainmotier as fixing its primitive character; if the interior proves that the earlier Romanesque differed less from the later in internal than it did in external work, there is surely no difficulty in so believing.

The piers in the nave of Romainmotier are not so heavy as many of those to which we are accustomed in England; still they go beyond the thickness of anything which can fairly be called columnar. But at Schaffhausen the greater part of the nave—the rest of the church being perfectly square and plain—has columnar piers with a palpable diminution and some attempt at an entasis. The capital is a plain cushion, an advance on the rude attempt at cutting off the angles at Romainmotier. Something like this, but much more massive, may be seen in the crypt of the palace chapel at Chur. The nave of Constanz Minster has been so greatly tampered with that it is hard to know how far one can trust anything; still, with the Schaffhausen example before our eyes, it seems possible that the columnar piers, with a still more distinct entasis and a multiplied cushion capital, may be genuine. In the crypt of the same cathedral are some undoubtedly genuine early shafts of various shapes. In one there seems to be the rudest attempt possible at the cushion capital; while another column, with the rudest possible base, has a capital covered with rather elaborate foliage. This was doubtless cut out afterwards, but I know no reason why these plain capitals, both here and at Westminster, may not have been from the beginning designed to be cut out. The only view which forbids the belief is the theory that the chisel was not in use till late in the twelfth century, and this theory, as we have seen, falls to pieces as soon as we attentively consider the passage of Gervase on which it professes to be founded.

The Abbey church of St. Maurice has been almost wholly re-built in the modern Italian style, but it is said that the piers, though not the arches which they carry, are part of the original Romanesque building. I thought that the piers themselves, plain round columns, were genuine, but I doubted about their quasi-Doric capitals. I do not however decidedly pronounce against them.

I must end with a few examples in which we get the primitive style brought into contrast with more ordinary Romanesque, with the style contemporary with, and answering to, our Norman. If I am right in my theory, architecture everywhere took a great stride in the eleventh century, Men began at once to strike out new paths for themselves and to imitate classical models with more precision. I hold the primitive style to have been an importation from Italy, after Italian architecture had developed for itself a character distinct from the earlier classical models. The later Romanesque, so far as it imitates at all, falls back upon the classical models themselves. Of course it did this in very different degrees, according to the number and merit of the Roman Remains in the country. France—even Normandy—is more classical than England, and Aquitaine is more classical than France. Again, it strikes me that, while in England at least the later Romanesque violently supplanted the earlier, in more Southern countries it was, to a certain extent, developed out of it. We have seen something like this in the towers of Sion and St. Maurice, and I may remark that the double splay, so characteristic with us of the earlier style, is in this country often continued in the later. It follows from all this that the style which, in countries like Aquitaine and Burgundy, answers to our Norman, is very much more classical than our Norman. Examples of this style I see in the church at Grandson, and in the Romanesque parts of the minster at Neufchâtel. M. Blavignac* refers Grandson to the time of Charles the Great. I see nothing distinctively primitive about it. The plain square portions may indeed be of any date, as early as Romainmotier or as late as the Great Minster at Zürich. But though the columns of the nave are doubtless, as M. Blavignac says, Roman columns used up again, their capitals are assuredly not earlier than the twelfth century or the very end of the eleventh. So at Neufchâtel and other places, where M. Blavignac sees work of the tenth century, I can see only advanced Romanesque, sometimes actually Transitional, work of the twelfth. Now in the two small churches of St. Sulpice, near Lausanne, and St. Peter, near Sion, we find the primitive style, very plain and simple, brought into close juxtaposition with later Romanesque, the upper part of the tower in both cases having been added or rebuilt after the later fashion. The churches are small domical* buildings, much like many of those in Aquitaine, the cupola being covered at St. Sulpice by a square, and at St. Peter's by an octagonal, tower. The upper stages of both are later, marked clearly by the masonry as well as by the details. Those details are well worth studying, as showing how the later Burgundian work differs alike from our own Norman and from the primitive style of the country. The interiors of both churches are quite plain and square, except that one pier at St. Peter's assumes for about half its height—the lower part being square—the genuine form of the massive round English pier.

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* P. 122. Because Charles the Great used up Roman columns in his buildings, it does not follow that later people did not do so also.

I have now said pretty well all that I have to say both on particular buildings and on the general question which I wish to start. Doubtless I could describe and comment on this and that church at infinitely greater detail, but I did not look upon that as being my province this evening. As for the general question, I leave it in the hands of my hearers. Thoroughly to test it, as I trust some one will test it, would require a much greater knowledge than I possess of the buildings of Germany and Italy, and of that large portion of Gaul which lies between the Canton of Vaud and the buildings which I mentioned in the Pyrenees. Remember I am only starting questions, not putting forth dogmas *ex cathedrâ*. Whether I am right or wrong, I am sure that the questions which I propose will be found deeply interesting, and that much curious and valuable knowledge will be found out in the course of their investigation. I will only add, or rather repeat, two cautions. As I am dissatisfied with the early dates of M. Blavignac, I am also aware that there are antiquaries who would look upon many of my dates as also too early. But as I before said, if all my examples are shown to be of the twelfth century, my case is not disproved. The styles are different, and to prove that Earls Barton and Romainmotier were of the twelfth century would only show that the two varieties of Romanesque coexisted side by side longer than I had thought that they did. Again, I trust that examples of the primitive style will be found in various other parts of Western Europe; such buildings as the Abbey Gate at Lorsch, which I have not seen, and the Temple of St. John at Poitiers, of which my drawings are too imperfect to enable me to speak with much certainty as to its details, will, I hope, be proved to belong to it. But should it be shown that the style is confined to the two or three corners of Europe where I have observed it, nothing will thereby be proved against the general existence of the style at an earlier date. England cannot have been in league with remote corners of Burgundy, Swabia and Aquitaine, to produce tall unbuttressed towers with mid-wall shafts. The resemblance cannot be accidental; it cannot be the result of direct imitation; no explanation, as it strikes me, can possibly account for the phænomenon, except to look on all as independent offshoots from one common stock.

The CHAIRMAN, Mr. G. E. STREET, Vice President, said he was sure they all felt greatly indebted to Mr. Freeman for the paper he had given them, and he hoped it would elicit some remarks from those present. It was a great privilege to an Institute, consisting for the most part of professional men, that occasionally persons not strictly professional should give them the benefit of their scientific inquiries and researches into the history of architecture, and lay before them information on subjects which most of them had not the time or opportunity to inquire into for themselves. They therefore owed their thanks to Mr. Freeman, though perhaps he ought hardly to speak of him as an amateur, but rather as one who though he devoted himself chiefly to another branch of study, had nevertheless placed before them a vast amount of information on a subject of great interest to them all. And as they were favoured with the presence of another distinguished writer on architecture, who had given them much valuable information on the subject of the early architecture of Germany, before saying anything on Mr. Freeman's paper, he would ask the Master of Trinity to oblige them with some observations upon it.

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* St. Peter has a genuine cupola, and St. Sulpice something which, by a little stretch, may be called one.

Dr. **Whewell**, Hon. Member, in answer to an invitation from the Chairman, said he had had his attention drawn to the subject of the formation of the styles of architecture in Europe many years ago, but he had long felt that what was known then was only a very small beginning of what was known now by every person in the room, and therefore it was not for him to attempt to offer any fresh ideas on the subject. He had listened with interest to the remarks in the paper as to the connection of English architecture with Italian. When he first visited Italy he was struck with the character of the Italian steeples and towers noticed this evening. It was a very curious question how far these were connected with our Norman or *Saxon* architecture, as we then understood it. The notices that had been given of the probable derivation of the English examples from the Italian required a great deal of development, and there was a great deal which was novel to him in the statements made in the paper just read. He could perhaps best make the members understand the point of view in which they regarded the subject, by taking them back to a very ancient mode of denoting it:—What was now called Norman, was called Saxon fifty years ago; and it was only after some years—though the time was nearly forgotten—it was made out by antiquarian research that there was scarcely any building of note which could be proved to be anterior to the Conquest in England, and when this had been established, a few persons acquainted with the subject, such as Mr. Petrie, Mr. Blore, Mr. Rickman, and others, pointed out that there were certain buildings—the church of Earls Barton, and others of that kind—which must be considered, if anything could be so considered, as anterior to the Norman buildings, because they seemed to have peculiarity enough to make a style; and had beyond doubt internal evidences that they were anterior to the buildings of Norman features which accompanied them. They *seemed* to have peculiarities enough to make a style, but of that there was a doubt. The strange name given to this kind of building, as it might seem to the younger members of the profession—*long-and-short* masonry—showed how difficult it was to seize the peculiarities which marked the style; but the name "long-and-short" arose from this—that in place of having the quoins at the angles of the building, with the projection alternately on the faces;—for instance at the north-east angle alternately on the east face and the north face—these buildings had alternately, down the angle, long stones vertical and short stones horizontal. That was one of the features at Earls Barton and other places. The stone carpentry was, as it had been just called, another peculiarity of these buildings; the mid-wall baluster was another. The question was whether these peculiarities were sufficient to make a style at all. They might entertain some question of that still, as there were not above a dozen of those buildings in England. One question was whether they did make a style; but whether these were derived from Italian buildings must be a doubtful matter. These were questions which had sometimes occupied the minds of amateurs like himself, and even now had hardly been quite solved; and all steps towards the solution of it contributed by persons having an intimate knowledge of foreign styles as well as English, and had studied the history of foreign as well as English architecture, were extremely valuable; and in that light he was sure the paper they had heard this evening must be regarded.

Mr. **Ferrey**, Fellow, asked Mr. Freeman to explain how he applied the term Anglo-Saxon to any buildings erected in England subsequently to the Norman Conquest?

Mr. **Freeman** answered that, as he had said in his paper, the case was simply the usual one of all Transitions; the later buildings of the old style and the earlier buildings of the new style were contemporary. The event of William's victory did not at once cause a revolution in architecture; some buildings in the new style had been built before 1066, and some buildings in the old style were built after that year. If then those styles were to be called respectively "Anglo-Saxon" and "Norman," it followed that there were some "Norman" buildings earlier than the Conquest, and some "Anglo-Saxon" buildings later. The best illustration of his meaning would be found in the churches at Lincoln, which he had already spoken of. There are in the lower parts of that city certain towers, not quite free, it may be, from an infusion of Norman ideas, but still, on the whole, decidedly "Anglo-Saxon" rather than Norman. Any one would, previous to any historical information about them, set them down as some of the latest examples of "Anglo-Saxon" work, just before that style gave way to Norman. Now he found, on the authority of Mr. Parker—who however used the fact to prove one thing while he used it to prove another—that these towers were actually built after the Conquest. The English, or rather Danish, inhabitants of Lincoln were driven from the upper town, and formed a settlement at the foot of the hill, where they built these churches. Meanwhile the Norman castle and cathedral were rising on the acropolis above their heads. Here was a distinct case of the two styles being used side by side after the Conquest, the English builders continuing to build essentially in the old national way, though perhaps not without some slight influence from the fashionable foreign models. So at St. Alban's, as he had already mentioned, though the church was built by a foreign Abbot, and one who so despised his English predecessors that he turned them out of their graves, yet some distinct features of the earlier style could be seen, owing possibly to the accumulation of materials which Matthew Paris records to have been made by the later native Abbots. Here again is a case of "Anglo-Saxon" work after the Conquest, and doubtless other examples might be found, if we had more exact dates of the building of our smaller churches.

Mr. **Ferrey** mentioned that there was a curious little tower with balluster shafts in the belfry windows still existing at Wickham, near Newbury, which was clearly Romanesque.

Mr. **John P. Seddon**, Hon. Secretary, said it was an interesting question whether a style of *Romanesque* more directly founded upon the decayed classical Roman, had existed throughout Christendom at a considerably earlier date than those locally varied styles usually grouped under the name of *Romanesque*—such as the Norman, Lombard, German and French varieties. This point might doubtless be successfully investigated, and he hoped it would be so, by antiquaries such as his friend Mr. Freeman. The church at St. Castor at Coblentz, which had been referred to by Mr. Freeman, in itself an early and characteristic example of the more usual German Romanesque, exhibits a considerable portion of a much earlier building incorporated with it. This is evidently a direct but rude imitation of classical Roman work, without the freedom, vigour, and grotesque imagery of later Romanesque. It has pilaster strips as decoration intersected by string courses (not entablatures,) the moldings of details of which are simply debased Roman. The date to which this part of the building is referred is about the seventh century. The western doorway to the nave at the church of St. Woolos, Newport, Monmouthshire, has in each jamb a column evidently Romanesque, but not Norman, and yet not of the balluster description, but with foliaged capitals, molded bases and shafts, with an entasis resembling Roman. These would appear to belong to an earlier style than Norman, but of a superior class to what Anglo-Saxon has usually been considered.

The **Chairman** said if it would not be trespassing too much on the kindness of Mr. Freeman, he should like to ask him to give some explanation as to the roofing and plans of the churches he had described, for he held that interesting as their towers were, the system of roofing and the ground plans were of even greater importance in their history. As far as he gathered, and from what he knew of some of these churches, and from what he had heard this evening, he was inclined to think that the commonest type of ground plan in the early Swiss churches was that common plan of a cross church with one of three apses at the east end, and he was naturally curious to know what was the nature of the roofing of some of Mr. Freeman's examples. It was well known to those who had examined the churches in Aquitaine, in Auvergne, in the Pyrenees and throughout a great part of Spain—from Gerona on one side to Santiago on the other—that in all these districts there exist churches executed in the eleventh and twelfth centuries, which are roofed with a barrel vault over the central nave, and with two half barrel vaults over the aisles, whilst the eastern apses have semi-domes. He had no doubt that the earliest of these examples were of the eleventh century, and he was amazed to find the similiarly designed and constructed church of Granson, on the lake of Neufchatel, seriously described by M. Blavignac—himself an architect—as being a building of much earlier date, either of the ninth or tenth century—he forgot which—in which opinion he was followed by Mr. Fergusson in his "History of Architecture." It had always struck him as being an eleventh century church, and what Mr. Freeman had said about it confirmed him in this opinion. Another group of early churches like that of Schaffhausen seemed to have been roofed with wood, with the exception of the eastern apses, which were almost always covered with semi-domes. It was a remarkable feature in these early churches all over Europe, that whatever the roofing may have been, the Italian plan of three parallel aisles, a central lantern over the crossing, and parallel apses at the east end, was carried out so universally that they might take it as one of the great types of the time. Referring to the steeples described by Mr. Freeman, it seemed to him that in the churches of St. Maurice and Sion, the towers in fact belonged to two different styles, although they seem to have strück Mr. Freeman as being identical in style and feeling. [Mr. Freeman, Not quite]. That of St. Maurice seemed to him to be distinctly a Romanesque steeple of the previous kind, whilst that of Sion differed altogether from it in design, and following the example of the steeples in Lucca, there was a regular progression of openings in the tower, the lowest stage having one, the second two, the next three, and the fourth four windows. This type of steeple was repeated very far off, and he remembered one in the centre of Spain. The steeple of St. Maurice was very regularly divided into stages separated by corbel-tables, and with flat pilaster buttresses at the angles and in the centre of each side. He should be glad if Mr. Freeman would favour them with a few additional words upon the roofing and plan of these churches, with some explanation of his views as to the occurrence of the square east end. To him it had always seemed that one of Mr. Freeman's examples, the church at Romainmotier, had originally had three eastern apses, and he doubted much whether any example could be adduced for a choir and aisles with three square eastern end walls in this part of Europe. In conclusion, he would remind the meeting that these early churches often contained other features of interest beyond those which had been referred to, and to take one example, he remembered seeing in the old cathedral on Mount Valeria at Sion, a thirteenth century rood screen and loft between the nave and the choir, and a very good Gothic organ and case at the west end of the nave.

Mr. Freeman said he did not undertake to give a very minute antiquarian description of all the buildings which he mentioned. Some of them he had only seen in the intervals of other work, and in places where he wished to spend two or three days, he had often been able to stay only as many hours. He did not positively say that the Romainmotier had originally a square end: but the square end is as clearly found in some instances as the apse is in others. The east end of Schaffhausen is square; so are those of the two minsters at Zürich. [The Chairman believed Schaffhausen had no aisles. Mr. Freeman—Not quite to the east end.] With regard to the roofs, he imagined the Chairman referred to cases where there was vaulting; timber roofs he must confess were the last things which he ever thought of examining. St. Sulpice had a dome and a semi-dome over the apse. Grandson had a barrel vault, and other instances of that form were common in Aquitaine. Schaffhausen seemed to have had a flat roof like many of our Norman churches. At Romainmotier a later clerestory and vault had been added to the nave. To the central space of the western chapel he could say nothing, because it was cut up by floors. The aisles had a perfectly plain cross vaulting without groins or ribs. With regard to St. Maurice and Sion, it was only the towers which he had been talking about; the rest of the church in both cases was much later. The little chapel on the side of Valeria he thought had no vault. As far as the three great towers were concerned he was inclined to put Schaffhausen as the most distinctive of all, just like one of our Anglo-Saxon towers somewhat improved. At St. Maurice they had an approach to common Romanesque, while at Sion they had something still in advance of that. The three towers were certainly not identical; he looked on St. Maurice and Sion as examples of primitive Romanesque developing into something else, still retaining a good deal of the primitive style, but gradually changing in the later forms. Schaffhausen alone of these large towers showed the primitive type in full perfection. As he had stated in the outset of his paper he had merely put forth some hints for others to work out. He had not visited Switzerland directly for any antiquarian purposes, nor had he commonly directed his course with reference to antiquarian purpose. Romainmotier indeed he had gone to see directly for the sake of its church, but the other places he had visited on other business, and many of the examples which he had spoken of, he had come across almost by accident, and was very thankful so to have found them. His whole object was to throw out a theory, which he left others to accept or reject as further inquiries might lead them to do.

Mr. JOHN W. PAPWORTH, Fellow, said that the judicious manner in which Mr. Freeman had worded his case, must render the meeting indisposed to see any captious feeling in the single remark that he might offer upon the latter portion of the paper just read. It was, simply, that adding the original western towers of Lincoln cathedral, and the steeples at Caen, to the campanili at Ravenna and at Rome, suggested by Mr. Freeman as standards for a comparison, he was not inclined to give an immediate assent to the theory which Mr. Freeman had propounded. Such incredulity may be right or may be wrong, but it was instinctive on the present occasion, and it was always the difficulty attending a meeting of this nature that when Mr. Freeman presented such opinions, bearing the impress of such authority, it was scarcely possible for any person but one who had accompanied him in his journey and in the collection of his observations, as well as in the preparation of his deductions, to improvise a fair criticism, or to offer compliments which would not appear to acknowledge Mr. Freeman's conclusions as inevitable. The meeting clearly felt that its thanks were due to Mr. Freeman for the manner in which he had brought forward the points that he supported, and for the large fund of subject for consideration which he had given. Mr. Papworth wished to express his personal delight at the prefatory remarks in which Mr. Freeman had so well conveyed to young and old the lesson that to study art aright they must do so not only as artists, but as men who see in the works of their predecessors the character of the people of the age. He ventured to throw out for Mr. Freeman's consideration, when sparing further time to the subject, or when re-editing the valuable "History of Architecture," the possibility of the existence of a large quantity of buildings in all parts of Europe, (excepting of course those not christianized till a late period) which might suggest materials for a paper similar in its nature to that just read. Mr. Papworth's view was that *in each country*, when Roman power succumbed, Roman art left its seeds; and that these seeds, far from at once perishing as is generally assumed, produced plants which *ran back*, as a floriculturist would say. So that, taking England for example, there should have been left by the Romans a manner of building corresponding in all respects (except under influences of habits and prejudices of the people), with that executed under similar circumstances elsewhere; and perhaps this got worse by degrees, until the arrival of a new fashion, *whether from the north or the east.* The old and the new manners might be supposed to suffer of course a greater or less degree of deterioration in their transport. It would be desirable to ascertain the amount of influence on art exercised by artificers from Italy in England, and to *compare it with that which must be ascribed to British missionaries while founding their monasteries.* It should not be forgotten that as England at a later period accused the court of Edward the Confessor of being Norman, we might expect that his buildings would offer examples of any peculiarities of the artificers employed by the Norman dignitaries; while the patriots (as they would consider themselves,) would continue to build in the manner to which they had been accustomed. In return, the best authorities agree that afterwards English influence in some provinces of France was as evident in building as in war. Because art turned backwards and forwards in this manner over the face of the civilized world, it seemed difficult to permit belief in the idea of a central type, except at the periods of marked revolutions of style. An account of the reasons for these revolutions is one which should be strictly rendered, and which we have still to demand. He had the honour to propose their vote of thanks for the very able paper, which they should be ready to peruse deliberately, and to consider with interest, although deprived of the advantage of referring to the sketches as illustrations, or rather evidence in Mr. Freeman's favour.

Mr. C. F. **Hayward**, Hon. Sec., said, having been much interested in the study of Romanesque Architecture in Germany, he had heard with great pleasure Mr. Freeman's remarks with regard to a district which he (Mr. Hayward) was not so well acquainted with. In one part of the district alluded to, particularly on the Lake of Constance and along the Rhine to Schaffhausen, Mr. Freeman had spoken of churches with the eastern ends built square. This was remarkable, for in making that journey himself, coming from the centre of Germany, the chief instances of Romanesque architecture he had met with, particularly that splendid example, Bamberg Cathedral, had numerous apsidal terminations at both ends, and often at the transepts also. So that at one time he almost thought that these apsides must have been a distinguishing feature of Romanesque architecture, derived directly from the tribunes of the Basilicas of Rome. But when they came to consider other varieties, and trace the style through some of its phases under the terms of Anglo-Saxon, Norman, &c. and considered how the local peculiarities affected its development in different parts of Europe, its importance as a study became apparent, and any contribution to that history ought to be received, as he was sure this paper would be by all, with great satisfaction and delight, illustrated as it was with such a variety of interesting sketches. He only hoped Mr. Freeman would carry out the enquiry further, for it seemed to him to have been greatly neglected, and many a church of plain exterior, with a few round arches to show in its elevations, had been passed over as not worth considering, in Germany and elsewhere, which would have repaid a large amount of research and trouble. In a paper read by himself before the Institute, in the year 1854, discussing the Romanesque style as developed in the churches on the Rhine, and at a little distance from that river, (the period of which he had ventured to term the "Pre-Gothic Age,") he had taken occasion to remark upon that most interesting Abbey Church called Kloster Laach, which, although about eight miles inland from Andernach, was well worth a visit, and if any present were not acquainted with it, he would recommend, when making an excursion in that direction, this and the other noble Romanesque examples of Andernach, Coblentz, Maintz, Worms, &c. &c. to their especial study.

The **Chairman** remarked, that as this was the last meeting of the Session, it was probable that many of the members, before they met again, would pay a visit to the Swiss mountains. He hoped they would not, at the same time, neglect to examine the churches which Mr. Freeman had brought under their notice.

The proceedings of the Session then terminated.

Edward A Freeman

On Certain Early Romanesque
Buildings in Switzerland
and the Neighbouring Countries.

THE PAPERS OF QUESTIONS

USED IN THE

VOLUNTARY ARCHITECTURAL EXAMINATION,

HELD BY THE

Royal Institute of British Architects,

1864.

EXAMINERS - - Arthur Ashpitel, V.P. F.S.A.
T. Hayter Lewis, F.S.A.
George Gilbert Scott, R.A. F.S.A.

MODERATORS - Charles Fowler, Jun. Fellow.
J. W. Papworth, Fellow.

NOTICE TO CANDIDATES.

Each Candidate is expected, on entering the Examination room, to proceed immediately to the seat that may be assigned to him; to maintain quiet and silence; to address himself only to the Moderators in case he may require explanation or assistance; and to conform to their arrangements.

Answers are to be written only on one side of the paper. A margin of about one inch is to be left on the left-hand side of each page; and the answer to each question is to be begun at the top of a fresh page. The division and number of each question is to be written in the margin opposite the first line of the answer. The Candidate's number is to be put at the opposite top corner of each page.

A larger number of questions has been given than it is expected the Candidates can answer in the time allotted. This is done in order that they may have the advantage of selection; and the Examiners wish to impress most earnestly upon the Candidates the necessity of attending to the correctness of the answers, rather than to the number of them.

The mathematical subjects must be strictly worked out: the propositions from Euclid and the riders are to be considered as distinct questions, and are to be answered separately. It is not necessary that the questions in Physics, Professional Practice, and Materials should be worked out, in detail, further than is requisite to show that the Candidate has a competent knowledge of the subject; but mere indication of the rule will not be a sufficient answer.

It must be clearly understood that the Examiners wish to develope and recognize what the Candidates do fairly know, and not to try and throw difficulties and perplexities in their way.

CLASS OF PROFICIENCY.

FIRST DAY.—MORNING.

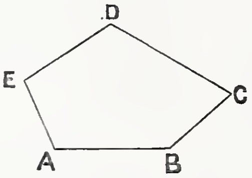
Design and Drawing.

One plan, elevation, and at least one section of a design for a Private Chapel with a timber roof; to be over a Library about 15 feet high in the clear, vaulted in brick or stone-work, in two bays longitudinally, *i.e.* with one row of pillars down the centre. The floor of the Library to be one foot above the level of ground adjoining. The staircase from the Library to the Chapel to be of incombustible materials, and to be vaulted. There is, also, to be an external staircase, with a porch, to the Chapel. To be in any style that the Candidate may select; and to be drawn (in pencil will be sufficient) *not sketched*, to a scale of $\frac{1}{8}$ of an inch to a foot: no colour but Indian ink is to be used.

FIRST DAY.—AFTERNOON.

Practical Geometrical Drawing.

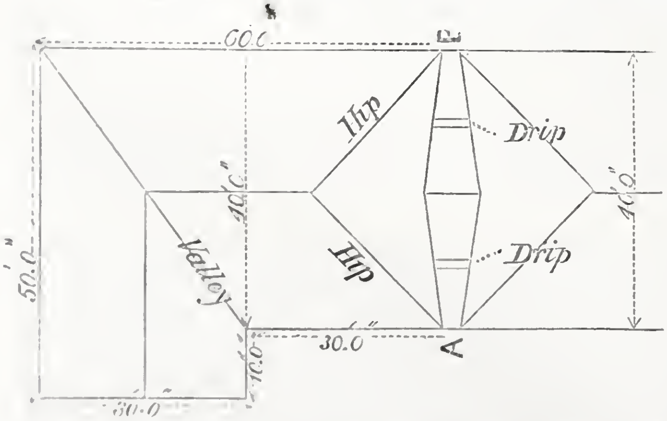
1. Draw the plan of a bay window of three sides; each of the canted sides being one half of the central face, and forming an angle of 55° with the wall of the house; and the width of the opening under the breastsumer being 12 feet.

2. Reduce this irregular figure  to a simple triangle by the parallel ruler only.

3. Draw the element of a Decorated Gothic clerestory window in the form of a spherical triangle, placing therein three equal spherical triangles with proper cuspings, &c. shewing the centres and points of contact of the curves.

4. Draw three parallelograms, 4 inches high by 3 inches base, and place therein by means of ordinates a semi-ellipse, a parabola, and a hyperbola.

5. A timber roof is of the form and dimensions as in margin, and the pitch is one-third of the span, shew the method of finding the lengths of the common rafters, hips, valleys, and ridges.



6. Referring to the above diagram, there is a middle gutter from A to B, falling both ways, 8 inches wide in the narrowest part, with a rise of 2 inches in every 10 feet, and with drips where shewn 2 inches high each,—what is the width of the lead above and below the drip and at the widest part, supposing it turns 7 inches up each lear board.

SECOND DAY.—MORNING.

MATHEMATICS.

Arithmetic.

N.B. The French mètre is 39·3708 English inches or 3·2809 English lineal feet: and the English foot is ·33527 French lineal mètre. The Florentine braccio is 22·98 English lineal inches, and the lira Toscana 7·82 pence sterling.

1. Suppose the French metrical system introduced into England, in what dimensions will you be compelled to specify—

Girders	8″ × 10″	2 in.	deal.
Joists	7″ × $2\frac{1}{4}$″	$1\frac{1}{2}$	do.
Heads and Sills	4″ × 3″	$1\frac{1}{4}$	do.
Quarter	4″ × $2\frac{1}{2}$″	$\frac{3}{4}$	do.

What would be the expression for a square of flooring? What would a stick of timber, 48 ft. long and 14 in. square, cube to under both systems?

2. Suppose the introduction of the French system abandoned but a decimal system enforced, the English foot being retained as the unit; how would you square out the following dimensions—12 ft. 2 in. × 6 ft. 4 in.; 13 ft. 7 in. × 2 ft. 8 in.; 29 ft. 5 in. × 6 ft. 4 in.; and how would you cube out the timber as in the foregoing question.

3. Land in a certain Manor descends according to the custom of Gavelkind, *i.e.* all sons inherit their deceased father's property in equal undivided shares. A man dies leaving three sons A, B, and C: they die; A leaving 5 sons, B 3, and C 4 sons. One of C's sons buys the share of one of B's sons, and the shares of two of A's sons. How much of the estate has he, including his own paternal share?

4. Divide the same sum 3·1416 respectively by ·4, ·04, and by ·004 prefixing the proper number of decimals to each operation and shewing the reason.

5. If 24 men can excavate a foundation in 36 days in summer when they can make 12 hours a day each, how many days must be allowed for 30 men to do the same in winter, when they can only work 8 hours a day?

6. A cubic braccio of marble at Carrara is worth 11 Tuscan lire;—how much can it be sold for in London per English cubic foot, adding $12\frac{1}{2}$ per cent. for freight and charges, and 15 per cent. profit?

7. To what will the following claim against a Railway Company amount properly carried out—

(*a*). A ground rent of £8. per annum for 7 years, and the reversion to the rack rent of a house worth £50. per annum in perpetuity afterwards, less 10 per cent. for losses and repairs, 5 per cent. collection and management, and insurance £600. @ 4s. 6d.

(*b*). A like ground rent of £10. per annum for 5 years, and the reversion to a rack rent of £80. per annum, subject to the like deductions, the insurance being for £1100. @ 4s. 6d.

(*c*). A piece of building ground 230 ft. front worth (unrealized) a ground rent of 6s. per foot, allowing 2 years peppercorn and 6 years to cover.

(Continued over.)

The ground rents to be taken on the 3 per cent. table—£1. per annum for 7 years tab. value$=$·6·230; for 5 years$=$4·579. The reversion on the 6 per cent. table—£1. received at the end of 7 years tab. value$=$·6651; of 5 years—·7473.

The building ground to be taken on the 4 per cent. table—£1. receivable at the end of 5 years (3 years mean of 6 and the peppercorn) tab. value$=$·8219.

Add 15 per cent. compulsory sale, and write out the whole fair as if to be handed up to a jury.

Algebra.

1. Add together $5a + 3b + 2c - 5$ and $3a - 2b + 2c - 2$; also $3ax^2 + 2by^2 - 8$, $-ax^2 + 2cy^2 - 10$, and $bx^2 + ay^2 + 20$.

2. State the rule for subtraction and give the reason for the same. What is the difference between $13a - 2b + 9c - 3d$ and $-4a - 6b + 9c - 10d$; also from $3x^2 + 2xy - y^2$ take $-x^2 - 3xy + 3y^2$, and from the remainder $3x^2 + 4xy - 5y^2$.

3. Extract the square root of $4x^4 - 28x^3 - 17x^2 + 6x + \frac{9}{4}$, and prove the result by involution.

4. Solve the following equations:—

(*a*) $5(x + 1) + 6(x + 2) = 9(x + 3)$.

(*b*) $\sqrt{12 + x} = 2 + \sqrt{x}$

(*c*) $16x + 5 : \dfrac{4x + 14}{9x + 31} :: 36x + 10 : 1$

(*d*) $(x + 1)(y - 9) = (y + 7)(x + 5) - 112$

$xy + y - 9x - 9 = xy + 7x + 5x + 35 - 112.$

5. A builder can buy bright pavers for facing at 60s. per M, and good stocks at 36s.,—how many of each sort must he use to make his brickwork cost him 42s. per M?

6. On letting some land out of a large estate to a farmer agreeing that he would keep ten sheep for every acre under the plough, and would have also an acre of pasture for every four sheep he kept, he ultimately took 700 acres,—how many sheep should he have?

7. The formula for the strength of cast iron girders of proper section supported at both ends is

$$W = \frac{c\,a\,d}{l} \quad \text{where}$$

W the breaking weight in tons, the load being placed in the centre,
a = area of bottom flange in inches,
d = depth of girder in ditto,
l = span, or length between supports in ditto,
c = a constant averaging 25.

Transform this formula so as to shew how to find the area, or the depth, or the length as may be required.

Euclid. Book 1.

1. What is the difference between a postulate and an axiom? Of what use are they in the demonstrations?

2. Proposition 11. Problem—Draw a straight line at right angles to a given straight line from a given point in the same.

3. Describe an isosceles triangle, the base and one of its sides being given.

4. Proposition 32, Theorem Corollary 2; All the exterior angles of any rectilineal figure made by producing the sides successively in the same direction are together equal to four right angles.

5. A piece of ground is bounded by five sides of different lengths, and there are obstructions, so that the interior angles cannot be taken, on boning out the sides in succession the following external angles were taken, 72° 15′, 56° 10′, 45° 45′, 66° 30′, and 120° 10′. Shew there is a slight error here and how much it amounts to.

6. Proposition 34, Theorem; The opposite sides and angles of parallelograms are equal to one another, and the diameter bisects them, that is, divides them into two equal parts.

7. Bisect the parallelogram from any assumed point in one of the sides; also by a line drawn perpendicular to one of the sides.

8. Proposition 38, Theorem; Triangles upon equal bases and between the same parallels are equal to one another.

9. Divide an equilateral triangle into four equal triangles.

Book 2.

10. Proposition 7, Theorem; If a straight line be divided into any two parts the squares of the whole line, and one of the parts, are equal to twice the rectangle contained by the whole and that part, together with the square of the other part:

Prove this by Euclid's demonstration, and also (*if there be time*) algebraically.

11. Proposition 14. Problem. Describe a square equal to a given rectilineal figure.

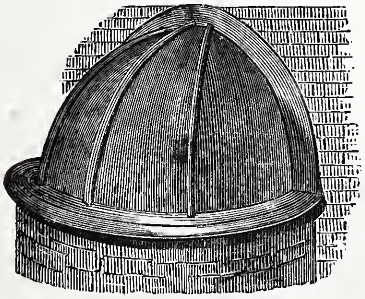
SECOND DAY.—AFTERNOON.

Mensuration.

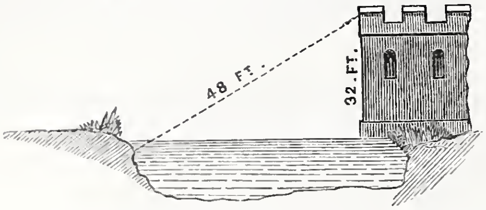
1. A circular grass plot, 15 yards in diameter, is enclosed by a circular gravel walk 7 ft. 6, *i. e.* $2\frac{1}{2}$ yards wide,—what ground does each cover?

2. A cylindrical zinc cistern is 4 feet diameter and 6 feet deep,—how much water will it contain, reckoning 6 gallons and 1 pint to each cubic foot?

3. The apse of a church is in the form of half a semi-sphere, 20 feet in diameter, and is covered with 7 lb. lead; there are three lead rolls, averaging the width of 4 inches each, extra to the curved superficial measurement, a flashing next to the church 6 inches wide, and a gutter round the parapet 8 inches wide,—what will be its cost at 35s. per cwt. including solder, nails, &c. complete?



4. Wanting to know the width of a moat to an old castle, my friend drops a tape down from the top of the battlements till it touches the water, which he finds to be 32 feet; he then throws me the end, which I catch, and strain the tape across to the edge of the moat, as shewn by the dotted line, and find it measures 48 feet,—what is the width of the water?



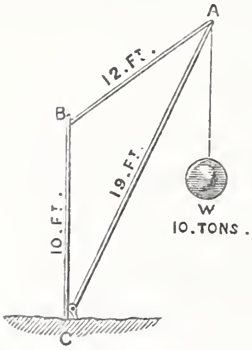
5. It is required to set out a circle for foot racing in a gymnasium to a public school, five times round, which shall be a measured mile,—what will be its diameter?

6. The old Winchester bushel was 18½ inches in diameter and 8 inches deep,—how much did that differ from the imperial bushel, containing 2218·192 cubic inches?

Physics.

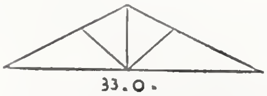
1. Give a short account of what have usually been termed the six mechanical powers. How many orders of levers are there; sketch them, shewing the fulcrum F, the power exerted P, and the weight W? Give the formula for the respective forces.

2. Explain the theorem called the parallelogram of forces, particularly as applied to a crane. Suppose suspended weight W = 10 tons; show by a diagram, to large scale of equal parts, the strains and the compressing forces on the various limbs; AC being the jib; AB the suspension rod; and BC the crane post. What is the strain upon the lower pintle C?



3. If a beam be supported at one end and loaded at the other, and will bear one ton; what will the same bear with the load equally distributed? If supported at both ends and loaded in the centre? If supported at both ends and the load equally distributed?

4. Apply the theory of the parallelogram of forces to a common king-post roof, one-third pitch, shew what parts are in compression; and what in tension, and in what proportion: supposing the trusses to be 10 ft. apart from centre to centre, and that the covering weighs 8 cwt. per square?



5. What is the difference in specific gravity between heated and cold air. What often occurs when a fire has been made at night in a bed room and suffered to go out, and why? What is meant by a *plenum* and *vacuum* in ventilation. What are the causes of draughts; and the methods generally taken to prevent them?

6. What is meant by direct, diffused, and reflected light? If a high building is erected to the *north* of a client's windows in what way is he injured, and of what class of light is he deprived?

PROFESSIONAL PRACTICE, ESTIMATING, &c.

1. Give a short sketch of the clauses usually introduced into a contract, to ensure the completeness and efficiency of the various trades, the excellency of the materials and workmanship employed, and the time allotted for completion,—and add such clauses as will protect both the client and architect against claims for extras on works in the specification, and for other unauthorized and unjust charges.

2. What clauses should be introduced into a contract to render the builder liable for any hidden or concealed defects which may appear after the works are completed, and the accounts settled? What are the proper clauses with regard to roofs, drains, &c. which compel the builder to keep the same in repair for a reasonable time after the completion of the works.

3. How are approximate estimates of the probable cost of buildings usually made, when the rough plans are completed, and there is no time to take out proper detailed quantities?

4. What is the value of a rod of brick-work the walls 1½-brick thick, faced with stock bricks at 30s. per M. alongside, backed with and bonded to grizzles at 26s., wharfage 1s., and cartage 3s. per M.; the lime at 12s. per hundred, and sand at 3s. 6d. per yard, both delivered; the scaffolding and labor as usual; the profit 10 per cent. on the bricks, and 15 per cent. on the rest of the work? Give sketches to shew how the bricks should be laid so as to insure a perfect bond in this work, and also in two-brick work; and the ways in which this is often evaded.

5. Give a short account of the customary method of measuring brick-work in London, especially as to the deductions? How is cube brick-work converted into reduced? What is meant by ramps, rakes, bird's-mouths, and skew-coins? How are they usually taken and priced? The like of sailing courses, dentil courses, single and double tile creasing, and any other similar work you may remember.

6. What is the customary method of measuring timber in London, when completed and fixed in a building?

If fir be worth £4. 5s. per load delivered into the builder's yard, put the price to the following items, allowing 15 per cent. profit.—

Fir—no labor.
Do. in bond, plates, lintels, and wood bricks.
Do. framed in floors.
Do. do. in roofs.
Do. wrought framed in ditto.
Do. in proper solid door and window frames.

7. To what dilapidations are tenants from year to year subject? If a tenant holds a house for a short term under the simple covenants "to uphold and maintain," how would you treat the question of papering and painting?

THIRD DAY.—MORNING.

MATERIALS.

1. What is meant by the word concrete, and what are its uses? What is it composed of and in what proportions?

2. What are the descriptions of lime generally in use? State the various qualities of chalk lime, that which is called grey stone lime, blue lias, and any other specimens you may have seen used.

3. What is the difference between kiln and clamp burnt bricks, and in what parts of the manufacture are the chief differences? Clamp burnt bricks are divided into two great divisions, commons and malms;—what are the subdivisions of each, and what are their uses and qualities?

4. What are the advantages and disadvantages of compressed bricks, and of perforated bricks? Where are the best red, white, or yellow facing bricks usually obtained from? What process of manufacture gives the best malms the peculiarly bright yellow hue?

5. Of what nature is Kentish rag stone, and whence is it obtained, and how is it generally worked? Shew by sketches the various ways in which it is used, as rough rag in foundations, random work, random-coursed work, regular coursed work, header work, arris-tooled quoins, and any other sorts you may remember. If backed with bricks how should it be bonded?

6. What are the other principal stones in use about London? Name as many as you can recollect, under the heads of primary or secondary stones, oolitic lime stones, magnesian lime stones, grit and other sand stones, &c.

7. What are the various species of fir timber generally in use in this country? What are the different names and qualities of the various sorts of Baltic and Archangel timber? Describe the various sorts brought from Canada and North America, and shew the very great difference between them in quality. What are the usual lengths of the sticks of timber imported, and what will they square to, without considering "out-sized" samples?

CONSTRUCTION.

Each candidate will draw one or more of the following details (to the scales as stated below) of the work he has done on the first day. He may improve on the character of his design therein.

One bay of the groining: plan, sections, &c. carried out as complete working drawings to a $\frac{3}{4}$ in. scale, with sections of the ribs, &c. to quarter full size.

One bay of the roof to $\frac{1}{2}$ in. scale, shewing the framing, caulkings to plate, construction of curved braces, junction of principals and ridge, iron bolts, straps and ties, and other detail.

One of the principal windows (with plan) to $\frac{1}{2}$ in. scale; the mouldings to quarter full size.

It is essential that each Candidate should append to the above a detailed specification of the work in each of the above subjects that he undertakes.

History and Literature.

1. Give an outline of the characteristics of the principal styles of architecture in Europe.
2. Give an account of the principal characteristics and history of any one style selected by the Candidate.

Inasmuch as the different Candidates have signified their desire to be examined, some in one stated branch, and some in several of various styles of architecture, and as separate sets of questions on each style would run to a most inconvenient length and be productive of great confusion, the Examiners have thought it better to request each Candidate to write a short, clear and comprehensive thesis on the particular style or styles of which he has already made choice, according to the marginal note which will be made by the Moderators on this paper when it is delivered to him. In awarding the marks no preference will be given to the selection of any one style before another; but the allotment of marks for the second question will depend on the knowledge and discrimination evinced by each Candidate in the treatment of those branches of architecture which he has selected.

The thesis is to be written in plain clear English, avoiding a loose incorrect style, and at the same time not affecting fine writing; and is to be illustrated plentifully in the margin by sketches of the various details to which allusion may be required. The following instructions to be strictly observed.

In *Classic Architecture,* in addition to the general history and description of the *Greek* style, careful notice should be taken of the succession and contour of the mouldings, the proportion of the orders, the character of the foliages and other ornamentation, and particularly the difference between the early examples, those of the age of Pericles, and the debasement under Hadrian.

If *Roman Architecture* be the subject selected, there should be a careful comparison of the various orders and their details, particularly the mouldings, capitals, bases, and other parts of the ordonnance.

If the *later period of the Roman Emperors* be selected, the variations in detail from the ancient types, as twisted columns, arcades without architraves, and other similar changes should be noticed.

In treating of the *Romanesque* and *Norman,* the transition from the plainer to the more elaborate forms should be noticed, the characteristics of the architecture supposed to be *Saxon,* that of the reign of the 1st and 2nd William and that of Henry II, including the early use of the pointed arch, the interlaced system of arcading, and the other salient points of the *Anglo-Norman.*

The architecture called *Early English* should be described with all its differences from the Norman, the changes of the shafted columns, piers and arches, groining, windows, and other details, as will be enumerated below; also the transition to the *Geometrical Gothic.*

If the *Decorated* period or fourteenth century architecture be selected, the like differences should be described, and particularly the various systems of tracery, whether geometrical, net-like, flowing or leaf-like, and the transition to the architecture peculiar to the fifteenth century.

The *Perpendicular* should be treated in the same way, tracing its changes down to the corrupt or *debased* period.

In treating of the *Mediæval styles,* describe the characteristics of the piers and arches; the pitch of the roofs, and their design (if of timber), and the groinings (if of stone), with their varied forms, and the nature, disposition and names of the different ribs; the arrangement of doors and windows with their decorations, tracery, &c.; the state of art as to the carving of figures, foliages, &c. must also be given; and, if there be time, the leading features of the various mouldings, and the manner of their disposition; the capitals, bases; plans of piers; the parapets; buttresses, with their set-offs, or gablets; string courses, and base tables; the characteristic ornaments, as the dog-tooth, ball-flower, crockets, finials, and any other peculiarity that marks the period should be shortly touched upon.

Some Candidates having desired to shew their knowledge of the *foreign styles* of *Mediæval* architecture, the same remarks as well as the following will apply. The characteristic differences between the *circular* styles and the *pointed* should be noticed: and the transition to the *rayonnant* and *flamboyant* styles, which should be fully described; as well as that of the period before the great change when the Gothic styles passed into those of *François I*, &c., particularly as exhibited in France, the Low Countries and Germany. In *Italian Gothic* the Lombardic should be noticed and its transition to the first pointed, and thence to the more decorated styles. The characteristics of decoration, particularly as to the use of coloured materials and terra cotta, the pitch and materials of the Italian roofs, should be noticed.

Where a Candidate has chosen the style generally called *Elizabethan*, the gradual introduction of Classic details should be described, at the time when part of the work bears a Gothic stamp; and the way in which the last of the Gothic details gradually disappeared should be mentioned.

An account of *Revived classic architecture* should treat of the three periods, that of Bramante, Michael Angelo, and Raffaelle; that of Palladio, Vignola, and Scamozzi; and that of Borromini and his followers: reference should also be had to the works of Inigo Jones, Sir Christopher Wren, or any other architects of this country; and to the form which *Revived Classic Architecture* has assumed during the last hundred years in France and Germany.

In treating of the *Literature* it will be sufficient to name the principal authors on each style, with a short notice of the time in which they wrote, and the nature of their subject. It will be well also to note the authors who have contributed to the *revival of Mediæval art*, and its progress during the present century.

CLASS OF DISTINCTION.

FIRST DAY.

Give a design for a Banquetting Hall for a City Company (the interior only), about 100 to 120 feet long, in any style the candidate may select. The drawings to be to the scale of one eighth of an inch to a foot; with details and decoration to a larger scale as may be found convenient: the use of colour is permitted.

The candidate will also execute a specimen of modelling, or make a large scale drawing from one of the several casts which will be provided.

SECOND DAY.

Algebra, including Quadratic Equations.

1. Multiply x^2, x, $\sqrt{x}$, and $\sqrt[3]{x}$ each by $\sqrt{x}$, and express the result by fractional indices.

2. Square $a+b-c$ as written, and also as a binomial expression by the use of brackets.

3. Divide 1, by $1+2x+x^2$ to four terms, also $ax^3-(a^2+b)\,x^2+b^2$ by $ax-b$.

4. Prove the surd $\dfrac{1}{x-\sqrt{x^2-1}}+\dfrac{1}{x+\sqrt{x^2+1}}=2x$ also $2\sqrt[3]{2x}+6\sqrt[6]{4x^2}+\sqrt[9]{8x^3}=9\sqrt[3]{2x}$

5. Solve the following simple equations:

(*a*) $\sqrt{(a-x)}=\dfrac{a}{\sqrt{(a-x)}}-x.$

(*b*) $x+1 : y :: 5 : 3$

and $\dfrac{2x}{3}-\dfrac{5-y}{2}=\dfrac{41}{12}-\dfrac{2x-1}{4}$

6. Also solve (*a*) $\dfrac{10}{x}-\dfrac{14-2x}{x^2}=\dfrac{22}{9}$

(*b*) $\sqrt{(x+6)}+\sqrt{(x+3)}=3\sqrt{x}$

(*c*) $x+5=\sqrt{(x+5)}+6$

(*d*) $x+y : x-y :: 13 : 5$ and $y^2+x=25$

7. A chancel of a church is paved in the centre (which measures 18 feet by 12 feet wide) with sets of encaustic tiles, each 6 in. square, or a set of 4 to each foot superficial, the margin is to be paved with another class of tile and takes exactly as many sets. How wide is it?

8. The floor of a room has just been relaid, and has taken exactly 30 squares superficial boarding, one side is known to be 10 feet longer than the other, what are its dimensions?

9. A building speculation being unfortunate, the assignee makes a call of £720. on the shareholders, but two being insolvent he makes a further call of £5. each on the others. How many shareholders were there in the original company?

EUCLID.—*Book III.*

1. Proposition 35. Theorem. If two straight lines cut one another within a circle, the rectangle contained by the segments of one of them, is equal to the rectangle contained by the segments of the other.

2. A projected railway having been surveyed through an estate I ask the engineer where the line will pass exactly: all he will tell me is, "it forms only one curve from a point A to B and the rise or versed sine is 6 chains," I measure the chord (A to B) which is 44 chains, how can I find the radius of the curve?

Book IV.

3. Proposition V. Problem. To describe a circle about a triangle.

4. On asking a similar question as to another part of the same line, the same engineer sends me a map with three dots on it which he says are points in the curve. Assume three similar points, find the radius and draw the circle.

5. Proposition 11. Problem. To inscribe an equilateral and equiangular pentagon in a circle.

6. Shew from this how a right angle may be divided into five equal angles.

Book VI.

7. Proposition 12. Problem. To find a fourth proportional to three given straight lines.

8. Shew by help of a scale of equal parts how a rule of three sum may be solved geometrically.

9. Proposition 19. Theorem. Similar triangles are to one another in the duplicate ratio of their homologous sides.

10. If the superficial content of a triangle which has a base of 40 feet is 800 feet, what is the content of one exactly similar which has a base of 60 feet?

PLANE TRIGONOMETRY, LOGARITHMS, &c.

1. Define a logarithm, and state its general use. What is called the arithmetical complement, what the characteristic, and what the mantissa?

Resolve the following questions:

- (*a*) If 5491 : 3144 be 2366, find a fourth proportional
- (*b*) Divide 8·40 by ·96.
- (*c*) What is the square of 1·21, and the cube of ·46.
- (*d*) What is the square root of 8464, and the cube roots of 6896, and 68·96.

2. Define and describe by a diagram a sine, co-sine, tangent, co-tangent, secant, co-secant, versed sine and co-versed sine; also the complement and supplement of an angle.

3. Prove the following theorems:

$$\sqrt{rad^2 - cos^2}, \text{ or } \sqrt{1 - cos^2} = sine$$

$$\sqrt{rad^2 - sin^2}, \text{ or } \sqrt{1 - sin^2} = co\text{-}sine$$

$$\frac{sine}{co\text{-}sine} = tangent$$

$$rad^2 + tang^2 = sec^2, \text{ or } \frac{1}{cos} = secant$$

4. Being about to erect a tropical plant house, I wish to know the height of the tallest palm in a neighbouring establishment. Fixing my instrument one and a half chains from the tree, 4·9 above the level ground, I observe the angle to the top 21° 31′. How high is the tree?

5. At Charleston it was observed that a gun from one of the forts was discharged and the sound reached the ear in 4 seconds; at the same time the sound of a gun from one of the monitors reached the ear in 6 seconds, and the angle between the ship and the fort was observed 48° 12′. How far were they from one another, supposing sound moves at the rate of 1142 feet per second?

Natural Philosophy and Physics applied to Constructive Purposes.

The *very large range* which the Candidates have taken in desiring to be examined on the *whole* of the above sciences, and the *shortness of time* available, renders it necessary to compress the following questions into the closest form. They have, however, been so set that the replies may be extended by entering into the theories at greater length, as time may permit. Candidates are again reminded that the correctness of the answers will be much more valued than the quantity of matter written out, and that they should all bear on constructive matters as much as possible.

1. *Statics.*—What is called the "vis inertiæ?" What is meant by force and resistance; by direct and lateral compression; by extension, or rending strains; and by torsion? How is the strength of various beams usually ascertained; and what is generally considered their best sections in wood, cast iron, and in wrought iron?

2. *Dynamics.*—Show what is meant by equilibrium, and how it may be disturbed by various forces. State how the respective effects of these are usually ascertained by the theorem called the parallelogram of forces, and give such instances as time will permit. State the great law of motion as to gain of power and of time, and exemplify the same by a system of two or more pulleys.

3. *Pneumatics and Hydrostatics.*—Explain what is meant by the pressure of the atmosphere. Exhibit its action by a short description of a sucking-pump. Supposing the exposed surface on the top of a steam-boiler to be 25 feet long and 5 feet wide, what will be the pressure of the air thereon if a vacuum is allowed to be formed?

4. *Hydraulics.*—Give a short account of the pressure of fluids; and how to estimate the same. A large liquor back has a side 10 ft. wide by 9 ft. deep, what is the pressure of the water therein, disregarding barometric variations? Describe the hydraulic press. If the plunger is ½ in. diameter, and the ram 10 in. and a pressure of 500 lbs. put on the piston, what will the ram raise? Give the theory and distinguish between this machine and what is called the hydrostatic paradox.

5. *Chemistry.*—What are the laws of chemical combination by volume or otherwise. Explain what is meant by the terms carbonates, sesquicarbonates, and bicarbonates; oxides, binoxides, and peroxides; sulphurous, and sulphuric; hyphosulphurous, and hyposulphuric acids, or any of them. What is meant by chemical equivalents, and by symbolical notation? What are the symbols for water, potassa, hydrochloric acid, sulphuric acid, and any other you may remember. What is the base of lime, in what form is it generally found? What changes take place in the burning, slacking and setting this important material? If time will permit define poor, rich, and hydraulic limes, with their characteristics and uses.

6. *Electricity and Galvanism.*—Give a short account of the manner in which this fluid is generated. What is meant by positive and negative electricity, and in what manner are these developed by the ordinary machines? What is meant by the electrical discharge? Describe the dielectric state of the air in a heavy storm, and the supposed cause of thunder and lightning. What is the best form of lightning conductor; how should it be insulated, and where should it terminate? Show the method of generating galvanism, and the effects of making and breaking the currents. Give a short account of the electric telegraph, with its modern use in large public buildings; also in conveying messages from a city to a west-end office, and other similar purposes.

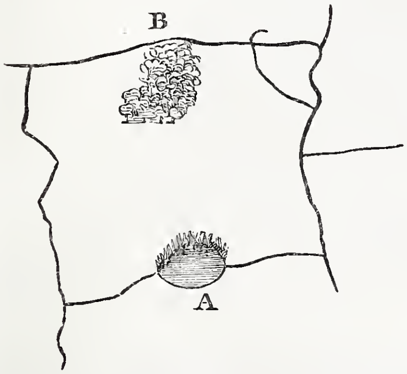
7. *Geology.*—Give a short epitome of the system on which the various rocks are generally classified. From which class do we obtain granite, and what are its component parts? What species of the igneous rocks are sometimes used in buildings? To what class does slate belong? The like of magnesian limestone; why is it supposed to decay so much in the metropolis? Which is the oolitic or Jurassic formation, and what stones do we obtain from it? Whence do our best marbles come, and how are they distinguished from lime stones? What is meant by the lamination of stone, and (in case of sand stones) how is it supposed to be occasioned? Of what class are York slabs, Bramley Fall, Whitby, and Park Spring stones?

8. *Acoustics.*—What is meant by sound, and what are its conductors and non-conductors? What is the difference between resonance and noise? Explain the undulations of sound and why some are pleasing and some dissonant and offensive to the ear. Shew also that undulations are reflected back from various substances, and that this reverberation may be smooth and pleasing, or confused and jarring, and why? What is the probable cause why rooms which are built of dimensions which are equi-multiples of each other are favorable to sound, and the reverse? What forms of ceiling are considered best for assisting hearing; which should you prefer, a flat ceiling with deep coffers, a semi-circular, or an elliptic form? What is the best form for the end of an oblong room when a speaker, or musician, is at the other end? Large square rooms have frequently an unpleasant echo especially when empty, the shutting of a door will cause a very loud and jarring sound,—how is this defect best cured, and why? If you wished to give peculiar resonance to a room, how would you construct the story beneath it, and with what material would you line the walls and ceiling? What are the best arrangements for seats in a concert room or theatre both for hearing and seeing?

9. *Colour.*—Which are considered the primary colours. Shew that from a mixture of these the secondary colours are obtained, and from these last the tertiary. Give the names lately affixed to all of them. What are the contrasting or complementary colours to the various primary and secondary? What is meant by the "harmony of analogy" and the "harmony of contrast" of colour; and by "contrast of tone" and "contrast of colour"? What is the theory of Mr. Owen Jones as to the decoration of surfaces, when only the three primary colours may be used; which should decorate the advancing surfaces, which the receding, and which the undersides? What is meant by power in colour, and what should be the relative strengths when some colours are used in large surfaces and others but sparingly? What is the reason why monochrome decoration, well treated, is often more pleasing than the most brilliant colours if not thoroughly well assorted.

LAND SURVEYING.

1. The enclosed is the sketch of a field: shew how you would stake it out for surveying by the chain only, supposing A to be a pond you cannot cross, and B a wood which you can neither traverse nor see across, and that the adjacent owners will not allow you to go on their ground. Give also a specimen of how you would keep your field book, shewing the off-sets, &c.



Scale $\frac{1}{4}$ inch to a chain.

2. Describe a theodolite with its various parts, and the method of adjustment previous to taking horizontal angles. Supposing the land in the foregoing diagram to be covered wholly with thick underwood, and only accessible from the *outside*, how would you proceed to survey it by the theodolite, working from the needle?

3. X Y and Z buy a small triangular field for £100. The base A B measures 10 chains; the side A C 7·45 chains, and C B 6·22 chains. The only access is by a road at the apex C. Divide the land equitably among them, supposing X paid £20., Y £30. and Z £50, and giving them all access to the road.

4. How do you ascertain to which owner a park pale or other boarded fence (dividing two properties) belongs? The like of a hedge and ditch. If the edge of the latter is much trodden in, what is the fair width to take, measuring from the centre of the bank?

LANGUAGES.

Greek.

From Dionysius of Halicarnassus, (*Antiq. Roman. lib.* iv. *cap.* 61), *The Capitol.*

Ἀκόυσας δε ὁ Ταρκύνιος, ἐπέστησε τοῖς ἔργοις τοὺς τεχνίτας· καὶ τὰ μὲν πολλὰ ἐξειργάσατο τοῦ ναοῦ, τελειῶσαι δ᾽ ὀυκ ἔφθασεν ἅπαν τὸ ἔργον, ἐκπεσὼν τάχιον ἐκ τῆς δυναστείας, ἀλλ᾽ ἐπὶ τῆς τρίτης ὑπατέιας ἡ Ῥωμαίων πόλις ἀυτὸν ἐις συντέλειαν ἐξειργάσατο. Ἐποίηθη δ᾽ ἔπι κρηπῖδος ὑψηλῆς βεβηκὼς ὀκτάπλεθρος τόν περίοδον, διακοσίων ποδῶν ἔγγιστα τὴν πλευρὰν ἔχων ἑκάστην. ὀλίγον δ᾽ ἔτι τὸ διαλλάττον ἕυροι τὶς ἂν τῆς ὑπεροχῆς τοῦ μήκους παρὰ τὸ πλάτος ὀυδ᾽ ὅλων πεντεκαίδεκα ποδῶν. . . . Ἐκ μὲν ὄυ κατὰ πρόσωπον μέρους πρὸς μεσημβρίαν βλέποντος τριπλῷ περιλαμβενομενος στίχῳ κιόνων, ἐκ δὲ τῶν πλαγίων διπλῷ. ἐν δὲ ἀυτῷ τρεῖς ἔνεστι σηκοὶ παραλληλοι, κοινας ἔχοντες πλευράς. μέσος μὲν, ὁ τοῦ Διός· παρ᾽ ἑκάτερον δὲ τό μέρος, ὅ, τε τῆς Ἥρας κὰι ὁ τῆς Αθηνᾶς, ὑφ᾽ ἑνὸς ἀετοῦ, καὶ μιᾶς στέγης καλυπτόμενοι.

What parts of speech are the following words, whence are they derived, and what is their meaning,—ἐπὲστησε—ἔφθασεν—ἐκπεσὼν—ὑπατείας and δυναστέιας (distinguish between these two.)

What is the difference between κρηπίς and θεμέλιος—ὀροφή and στεγη?

Define ἱερος, ναός, and σηκος.

In what respects did the Temple in the Capitol differ from others? by whom was it founded? by whom was it burned? and by whom was it finally restored?

Latin.

From Ovid. *Tristia.* (*Lib.* 3, *Eleg.* 1, *line* 25.) *The Roman Forum viewed by a Stranger.*

Duc age, namque sequor, quamvis terrâque marique
Longinquo referam lassus ab orbe pedem.
Paruit, et ducens, Hæc sunt Fora Cæsaris, inquit;
Hæc est à Sacris quæ via nomen habet.
Hîc focus est Vestæ; qui Pallada servat et ignem.
Hic fuit antiqui regia parva Numæ.
Inde petens dextram, Porta est, ait ista Palatî:
Hîc Stator: hoc primum condita Roma loco est
Singula dum miror; video fulgentibus armis
Conspicuos postes, tectaque digna Deo.

Give the meaning of the various terms, "fora," and why is this plural, "focus," "regia," "Porta," "Palatî," "postes;" also a short account of the origin and history of any of the buildings named above, if time will allow of it.

From Vitruvius. (*Lib. IV, cap.* 2.)

In ædificiis omnibus insuper collocatur *materiatio,* variis vocabulis nominata. Ea autem, uti in nominationibus, ita in re varias habet utilitates. *Trabes* enim supra *columnas,* et *parastatas,* et *antas* ponuntur in *contignationibus tigna* et *axes,* sub tectis, si majora spatia sunt, *columen* in summo *fastigio* culminis, unde et *columnæ* dicuntur, et *transtra* et *capreoli;* si commoda *columen* et *canterii* prominentes ad extremam *subgrundationem.* Super canterios *templa,* deinde insuper sub tegulas *asseres* ita prominentes ut parietes projecturis eorum tegantur.

Translate the foregoing passage; giving any explanation that may be necessary of the words in italics, in foot notes.

Give the Latin equivalent terms for the Base, Shaft, Flutes, Necking, Ovolo, and Upper member of a column; also for an Architrave, Frieze, Triglyphs, &c. and the Bed mouldings, the Plain face, and the large Upper mouldings of a cornice, with as many of their derivations as you may recollect.

French.

Translate from "La Loi du 3 Mai 1841," "De l'Expropriation pour cause d'utilité publique," (the Law analagous to our Lands Clauses Act) the following passages:

Titre IV. Du rêglement des Indemnités. Mesures préparatoires.

Art. 21.—Dans la *huitaine* qui suit la notification préscrite par l'art. 15, le *propriétaire* est tenu d'appeler et de faire connaître à l'*administration* les *fermiers, locataires,* ceux qui ont des droits d'*usufruit,* d'*habitation,* d'*usage,* tels qu'ils sont reglés par le Code civil. . .

Art. 23.—L'Administration notifie aux propriétaires et à tous autres intéressés qui auront été designés, ou qui seront intervenus dans le délai fixé par l'Art. 21, les sommes qu'elle offre pour *indemnité.* . . . . .

Art. 24.—Dans la *quinzaine* suivante, les propriétaires et autres intéressés sont tenu de declarer leur acceptation; ou, s'ils n'acceptent pas les offres qui leur seront faites d'indiquer le *montant* de leur *prétention.*

Translate from "Clauses et Conditions Générales, imposées aux Entrepreneurs," or the Conditions for Contractors published by the French Government.

> Art. 18.—*L'entrepreneur* aura soin de ne choisir pour *commis, maîtres* et *chefs d'ateliers,* que de gens probes, intelligents, capables d'aider et même de remplacer au besoin dans la conduite et le métrage des travaux. Il choisira également les ouvriers les plus habiles et les plus expérimentés, et néanmoins il demeurera responsable en son propre et privé nom, comme en celui de la caution, des *fraudes* ou *malfaçons* que ses agents pourront commettre sur les fournitures la qualité et l'emploi des matériaux, sous les peines indiquées à l'art. 12.

If there is time make any short comments on the words in italics, shew the difference between *propriétaire, fermier, locataire,* the rights of *usufruit, habitation, usage,* or any other technical terms you may be acquainted with.

The "prix de règlement," or "Builder's Price Book," issued by the French Government, contains the following trades:

Terrasse
Maçonnerie
Carrelage
Pavage
Granit
Asphalte et lava fusible
Ardoiserie d'Angers
Charpente
Couverture
Plomberie et Zincage
Canalisation pour le gaz
Menuiserie
Serrurerie
Fumisterie
Peinture
Dorure
Tenture
Vitrerie
Stuc
Marbrerie
Miroiterie
Vidange

Translate these terms into English, also as many of the following terms as time will permit—Ferme, Sabliéres, Tirant, Entrail, Poinçon, Poinçons ajoutés, Arbalétrier, Pannes, Chatignolles, Liens, Chevrons, Faîte, Faîtage, Coyaux, Boulon, Cheville, Trait de Jupitre, Queue d'hirondelle; and translate into French—Bed of a stone, Arch, Flying buttress, Vault, Cradle vault, Rib of a groin, Header and stretcher of a brick, Jamb, Lintel, Pediment, Tower, Spire, Turret, and Finial.

PROFESSIONAL PRACTICE, ESTIMATING, &c.

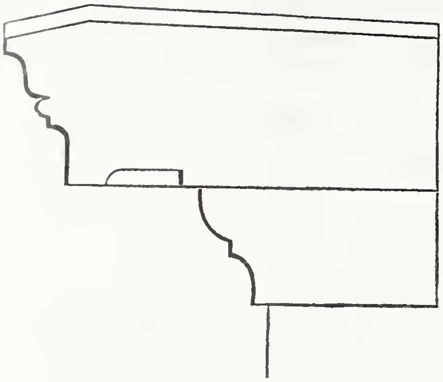
1. State the various duties to be performed by an architect, from the first general consultation with his client as to erecting a large building to the commencement of the works, to the completion and settlement of the accounts.

2. What are the duties of the clerk of works, and how is he generally selected? What are the duties of the builder under a usual contract? In case of a failure exhibiting itself in a building after its completion, as settlements, sinking of floors, unsoundness of roofs, dry-rot, &c., what parties are expected legally and morally to bear the blame, and the expense of reparation?

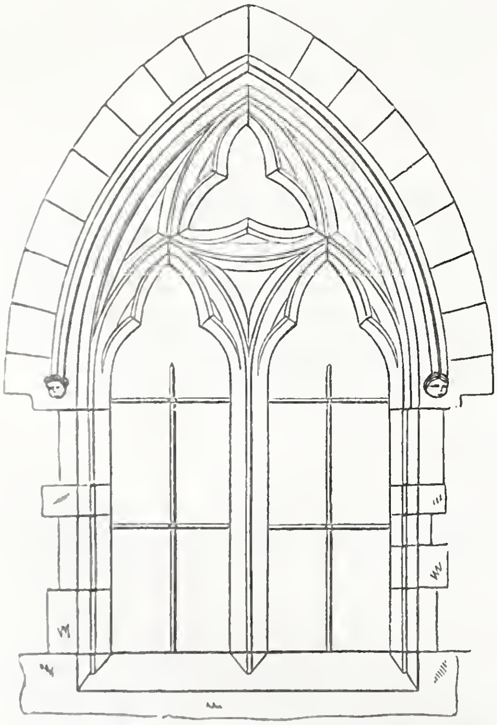
3. What are called "provisions" in a contract, and what clauses should be inserted therein to protect a client and architect from charges of extras on their execution, as well as from liability to third parties from whom articles, as chimney pieces, plate glass, &c. may have been obtained, in case of failure of the contractor?

4. What are the usual forms of certificates for payment of money from time to time, and also the final certificate for satisfactory completion? What precaution should be taken in giving this, so as to guard against the future discovery of work which may have been improperly executed, but so masked and hidden-up at the time as to deceive the parties who have had the superintendence of the same?

5. Below is the section of a Portland stone cornice to scale: shew the principle on which you would measure and value the same. What is meant by "cubic stones on the banquer," and how is this measured? Where would you take sawing and where only half sawing? Where beds and joints, joggles, &c.? Where would you allow plain and sunk work preparatory to taking the moulded work? What are the sinkings for drips, and what are the water joints, and how are they formed? How would you take care that such a cornice is well tailed down, or counterbalanced, to prevent accidents.



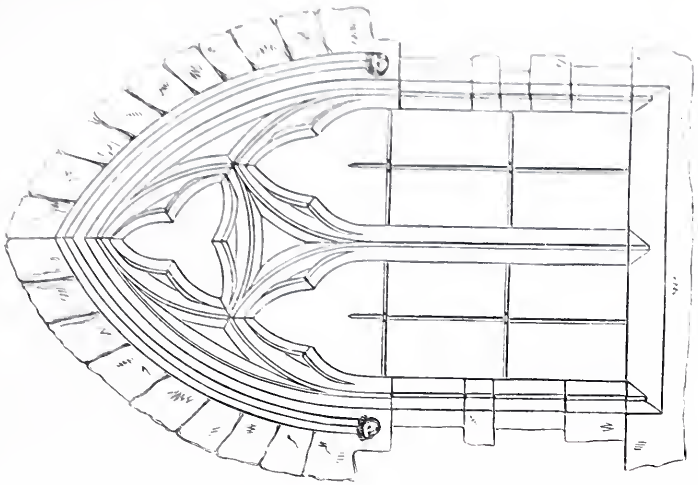
6. In the margin is a Gothic window with geometrical tracery. Suppose this to be executed of Caen stone, how would you take out the quantities for valuing the same, including glass grooves, saddle bars and stanchions, rough relieving arches, and everything except lead lights, and glass?

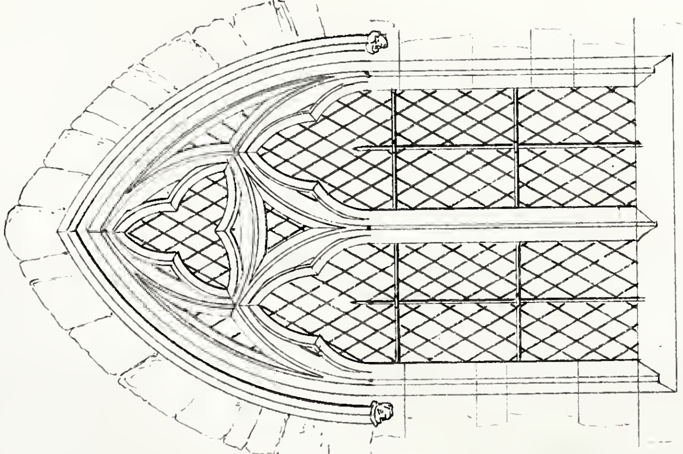


Scale ½ inch to the foot.

7. What are the rules laid down by the Courts for taking Ecclesiastical Dilapidations? Under what circumstances can painting and papering come into your valuation? How would you estimate the repairs to park paling and other fencing? What items can you take as to the Chancel, and what are expressly excluded?

8. State shortly what circumstances will set aside the Award of an Umpire; supposing the submission to have been properly drawn and stamped, and all the usual formalities strictly complied with.





2 Poets Corner
Westminster Abbey SW

27th July 1864

Dear Sir –

Enclosed are the proofs of the Euclid &c. plane and conics – also the Algebra for Friday – the Statics &c: shall be sent in the course of the day. Tomorrow's work should be on a separate sheet. Mr. Papworth will tell you how the Moderators would like it –

Very truly

Arthur Ashpitel

THIRD DAY.

MATERIALS.

1. The geological character of the various stones having been given, write a short account of—

   (*a*). Those in most frequent use in London, with remarks as to their comparative fitness for various purposes.

   (*b*). Their texture, appearance, colour, cost, and the usual way of working them, and the comparative value of the labour on each.

   (*c*). The like of any stones in local districts, with the use of which you may be acquainted.

   (*d*). What stones have been used at St. Paul's, the restoration to Henry VII's Chapel, the entrance portico at Euston Square, S. Dunstan's in the West, and the Houses of Parliament, or any other buildings you may recollect, and in what state are they now?

2. What is the usual time of year for felling oak timber, and why? At what time should it be felled, and how should it be seasoned if used in good work? From what parts of the world do we get the best foreign oak, both for carpentry and joinery? What is the ordinary objection to American oak when used for the former purpose? There has been much debate lately as to whether the timber in the old Mediæval churches is oak, or chestnut; if you have given attention to the subject, state the points of the controversy, and give your opinion thereon. What is called the sap of a tree, and what are the objections to its use?

3. What is Dry Rot, how is it generally caused, and what is its best cure? How does this differ from Eremacausis, or natural decay in dry places, or from the wet rot? What processes have been tried to arrest decay in timber of various kinds, and how have they succeeded?

4. What are the different qualities of fir timber obtained from the Baltic, Swedish, and Russian Ports? Give their names and chief characteristics. The like of Canadian timber. For what purposes may yellow pine be used with advantage, and what are its disadvantages for all other purposes? What are the characteristics of pitch pine, where may it be used, and after what precautions?

5. What are the essentials of good mortar; how would you judge of the quality of sand, and of lime? State the different sorts of the latter in general use, and explain what is meant by rich, poor, and hydraulic limes. By what artificial means can any of the former qualities be converted into a species of hydraulic mortar? What do the bricklayers mean when they say the mortar is "too fat"? If it has too little, or too much lime, what are the disadvantages. When may grout be used, and when is it injurious to the work? In what respects are "closers" or "closures" necessary to make good brick bond?

6. What sorts of mahogany are used in joiner's work, whence are they imported, what are the characteristics of each, and in what parts of buildings are they generally worked? If cedar, teak, green-heart, or any other unusual wood, has been used under your notice give an account of the same, with your opinions thereon.

CONSTRUCTION.

Nos. 2, 4, and 6 should be answered.

1. An octagonal stone spire, 70 feet high, 13 feet across at bottom, has been struck with lightning, and needs repair. Show by sketches the mode in which a scaffold should be erected so as to effect the same. There is good perpendicular bearing on the flat of the tower, and ledgers may be rigged out of the tower windows, but the scaffold must not touch the spire in any part. If it be necessary to take the whole down, and to replace it with one of timber covered with lead, how would you design the framing, if of fir; what precaution should be taken to guard against twisting or buckling; and how should it be secured to prevent accidents from high winds?

2. Sketch a simple collar beam roof, 26 feet span and 20 feet pitch, the collar 9 feet up the principal rafter. Show the weak points as regards the timbers, and the power tending to overthrow the walls, assuming a weight of 7lbs. per superficial foot, and that the trusses are 10 feet apart. If the walls are of brickwork, 21 feet high, how thick should they be? Show, also, the line of thrust, and the best section of buttresses to resist the same.

3. Show how the same roof may be strengthened by extra struts, by curved braces, or by hammer beams. What is the best method of constructing curved braces? Show how large semicircular roofs can be erected by using timber in thicknesses. Which is the best system, where thicknesses are put together on the flat, or side by side, and why? How are the heading joints made? State any large roofs you may remember to be covered on this principle.

4. In covering ordinary roofs, show how the plumbers' work should be executed, particularly the flashings and drips? What is meant by "bossing out" the cesspool heads of the gutters, and why is this done? What is meant by "burning in" flashings in stone parapets? Show by sketches the gutter boards, lear boards, and eaves courses of a roof covered with duchess slates. Sketch, also, a portion of the roof, supposing it to be one-third pitch, and showing to scale the proper lap and bond of the slates. Sketch, also, the timber ridge, the rounded roll, slates, lead, &c. complete.

5. Some semi-elliptical groins being about to be erected 18 feet square on plan in the clear, with a rise of 6 feet, and the clerk of works, and builders not being able to set out the lines for the centreing, show how it should be done both in direct section and on the "groin point," or line of the intersection of the vaulting.

6. Show how to strengthen timber girders—

(*a*). By trussing with oak, and iron bolts.
(*b*). The like with tension rods beneath.
(*c*). By the use of flitches of boiler plate.

Show also how wrought iron girders of great span are constructed, with sketches of the top and bottom flanges, angle iron, T iron, stays, &c. Give the general principles, and as many of the special formulas as you can recollect for ascertaining the relative strength of—

(*a*). Girders of fir.
(*b*). Oak.
(*c*). Cast iron of usual section.
(*d*). Wrought ditto.
(*e*). Story posts or columns of cast iron.
(*f*). Oak.
(*g*). Deal.

History and Literature.

The Regulations for this Class prescribe a notice of the structures, architects, writers on Practice and Theory, and works illustrating styles or structures, in any style or styles named by the Candidate; but regarding the limited number of Candidates, and the styles selected by them, the Examiners have thought it better, on the present occasion, to request each Candidate to write a clear and comprehensive thesis on the particular style or styles of which he has already made choice, according to the marginal note which will be made by the Moderators on this paper when it is delivered to him. In awarding the marks no preference will be given to the selection of any one style before another; but the allotment of marks will wholly depend on the knowledge and discrimination evinced by each Candidate in the treatment of those branches of architecture which he has selected. The thesis is to be written in plain clear English, avoiding a loose incorrect style, and at the same time not affecting fine writing; and is to be illustrated in the margin by sketches of the various details to which allusion may be required. The following instructions to be strictly observed.

In treating of the *Literature* it will be sufficient to name the principal authors on each style, with a short notice of the time in which they wrote, and the nature of their subject. It will be well also to note the authors who have contributed to the *revival of Mediæval art,* and its progress during the present century.

In *all cases* there should be a short enumeration of the principal buildings in each style, and if there be time a notice of their founders or architects; but essentially a biographical notice (if any memoirs have been preserved) of one or two leading Architects of the period or periods selected.

In the *Greek* style, careful notice should be taken of the temples, choragic monuments, and other buildings, in Asia Minor and Magna Græcia, as well as in Greece and the Islands.

If *Roman Architecture* be the subject selected, there should be an account of the origin and progress of the arcade, and more particularly of the system of building story over story, as in the case of the theatre of Marcellus and the Colosseum. The circular and octagonal temples, the triumphal arches, should also be noticed, as well as the temples of decidedly Greek form, and the character and arrangements of the public and private buildings found at Pompeii, &c.

If the *later period* of the *Roman Emperors* be that selected, the basilicas built or adapted by the early Christians, should be carefully treated of, with their several parts, and the variations from the ancient types.

In treating of the *Romanesque* and *Norman,* the buildings exhibiting the transition from the plainer to the more elaborate forms, the structures supposed to be *Carlovingian* and *Saxon,* and those of the time of Henry II, should be noticed.

The examples of the *Early English* period should include the military as well as the ecclesiastical edifices.

If the *Decorated* period be selected, a similar course should be adopted, with the addition of domestic architecture.

The *Perpendicular* style should be treated in the same way, tracing the changes down to the corrupt or *debased* period, and showing the abandonment of fortification in dwellings.

Some Candidates having desired to shew their knowledge of the *foreign styles* of *Mediæval* architecture, the same remarks as well as the following will apply. The best specimens of the *rayonnant* and *flamboyant* styles should be fully described; as well as those of the period before the great change when the Gothic styles passed into those of *François I,* &c., particularly as exhibited in France, the Low Countries, and Germany. In *Italian Gothic* the Lombardic should be noticed and its transition to the first pointed, and thence to the more decorated styles, especially such buildings as the Ducal Palace, and the Frari at Venice, the Palazzi of the Signoria with the Broletti of the Northern towns, the Duomo of Milan, that at Florence, and the Or San Michele at the same city, and as many more as time will permit of.

With regard to the style generally called *Elizabethan,* examples should be chosen showing the gradual introduction of Classic details, at the time when part of the work bears a Gothic stamp; those in which the last of the Gothic details gradually disappeared should likewise be mentioned: and, if the candidate is acquainted with similar continental works, it would be well to notice such buildings as the Church of St. Eustache at Paris, and the chateaux of the period, and any examples he may know in Italy, as the Certosa of Pavia, &c.

A notice of *Revived classic architecture* should include a comparison of the buildings in the three periods, that of Bramante, Michael Angelo, and Raffaelle; that of Palladio, Vignola, and Scamozzi; and that of Borromini and his followers: reference should also be had to the works of Inigo Jones, Sir Christopher Wren, or any other architects of this country; and to the form which *Revived Classic Architecture* has assumed during the last hundred years in France and Germany, with especial reference to bridges, statues, sepulchral memorials, and fountains; the management and construction of roofs, &c.

Besides such extracts from classic authors as will serve to test the general knowledge of a candidate in the next Examination for the class of Distinction, passages will be given from Pausanias, *Attica*, and from Pliny, *Hist. Nat.* xxxvi., with nomenclature from Vitruvius, *Archit.* iij. and iv.

Royal Institute of British Architects.

VOLUNTARY ARCHITECTURAL EXAMINATION, 1864.

ALPHABETICAL LIST OF CANDIDATES WHO HAVE PASSED (THIS YEAR) IN THE CLASS OF "PROFICIENCY."

AUSTIN, HUBERT JAMES	5, Collingwood Terrace, Gateshead.
BAYNE, RICHARD ROSKELL	13½, Great Smith Street, Westminster.
GOUGH, WILLIAM VENN	2, Exeter Buildings, Redland, Bristol.
HADFIELD, CHARLES (*Associate of the Institute*)	Knowle House, East Bank Road, Sheffield.
JAMES, ROBERT CULVER (*Temp. Student of Institute*)	32, Newington Place, Kennington, S.
JOWERS, ALFRED	15, St. George's Road, Kilburn.
LINKLATER, MORTIMER H.	Belfast, Ireland.

LIST OF CANDIDATES WHO HAVE PASSED (THIS YEAR) IN THE CLASS OF "DISTINCTION."

SPIERS, RICHARD PHÉNÈ (*Associate of the Institute*)	Oxford.
BAYNE, RICHARD ROSKELL	13½, Great Smith Street, Westminster.

M. Digby Wyatt, Fellow, Examiner last year, was unable to undertake the duties on this occasion, owing to the fact that these two gentlemen and Mr. Jowers, were in his Office at the time of becoming Candidates for the Examination.

EXAMINERS:—ARTHUR ASHPITEL, F.S.A., Vice-President.
GEORGE GILBERT SCOTT, R.A., Fellow.
T. HAYTER LEWIS, F.S.A., Fellow.

MODERATORS:—J. W. PAPWORTH, Fellow.
C. FOWLER, JUN. Fellow.

(Signed) J. P. SEDDON, } Hon. Secs.
C. F. HAYWARD. }

REPORT OF THE HONORARY SECRETARIES TO THE COUNCIL.

February 15*th*, 1864.

GENTLEMEN,

We have now the pleasure of reporting to you the result of the Second Voluntary Architectural Examination in the class of *Proficiency*, and the first in the class of *Distinction*.

The number of Candidates applying for admission to the Examiners was:—

In the class of Proficiency	Eighteen
In the class of Distinction	Two

being one less than last year in the former class; and one gentleman being a candidate in both classes is, of course, reckoned separately in both.

In the class of Proficiency it was found necessary in looking over the preliminary work to reject only three candidates, as not having sufficiently complied with the necessary regulations—thus leaving *fifteen* on the list of candidates admitted to the Examination—being one more than on the former occasion.

In the class of Distinction both candidates fully complied with the regulations as to preliminary work.

On the days of Examination these gentlemen duly presented themselves, and as will be seen by the reports of the Examiners and Moderators—which we herewith lay before you—acquitted themselves so well that both the character of the work done, and the conduct of the candidates themselves during the Examination, are the theme of commendation in both reports, and may be considered a source of congratulation to the Institute.

The final result is found to be that in the class of PROFICIENCY—*seven* candidates have obtained sufficient number of marks to pass—and that *eight* have failed to do so.

The names of the successful candidates are appended to this Report.

We may remark with regard to the above that the general standard of the Examination has been somewhat raised this year, owing to the allowance of marks permitted by the Council in the first year having been reduced one half. So that the number of marks necessary to be obtained was 2750, instead of 2500 as last year. Next year, however, the full standard of 3000 marks will be required. It is gratifying to know, however, that only one candidate who has passed required this allowance to make up his number, and that of the rest—the lowest obtained 55, and the highest as many as 1840—above the regular standard of 3000 marks; though this is after all not quite so favorable as last year.

One of the candidates who have passed, was allowed by a special resolution of Council (founded on the report of the Examiners last year) to attend only the third day of this year's Examination. One of the successful candidates is an Associate of this Institute, and one a Temporary Student; but it is remarkable that out of the whole number, *four* are from the Provinces and only *three* from London.

An analysis appended to this will show more clearly the peculiarities of the Examination, but we may further observe that several cases occur, as in the last Examination, where candidates obtaining many more marks altogether than necessary to pass* yet failed in one important branch, and so were unable to pass. This, in one or two instances, seems particularly unfortunate, but proves satisfactorily the great importance of the regulation.

In the class of DISTINCTION—*both* candidates have succeeded in passing with numbers of marks well over the necessary quantity. Their names are appended to this, and one of them will be well known as an Associate and a Prizeman of this Institute, as well as a Medallist of the Royal Academy. The other gentleman has the distinction of being the first to go through the entire Examinations (for Proficiency and Distinction) at once, and in the six days to obtain more than two thousand marks above the next year's full standard quantity required to pass both examinations.

In conclusion, we request your instructions to call together the Voluntary Architectural Committee, in order to consider and enable us to carry out the various suggestions of the Examiners and Moderators, if they should be deemed practicable, and to authorize us to issue a fresh edition of the Regulations, &c. of the Examination.

We are, Gentlemen,

Yours faithfully,

JOHN P. SEDDON, } Hon. Secs.
CHAS. FORSTER HAYWARD, }

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* One to the extent of 615, and another to the extent of 245, beyond the full standard of 3000 marks.

REPORT OF THE EXAMINERS,

(Presented to the Council, February 15th, 1864, and read at the Ordinary General Meeting the same evening.)

9, Conduit Street, February 13, 1864.

To the Honorary Secretaries of the
Royal Institute of British Architects.

Gentlemen,

Having carefully gone through the various papers and drawings exhibited to us by the Moderators, we now hand to you the number of marks which we consider due to the various candidates on each subject of each day. But as the only designation on every paper is a private mark of the Moderators, which is varied every day and wholly unknown to us, the results can only be made known when you have gone through our figures and have allotted them according to the said private marks furnished to you by the Moderators.

We fear that at first sight the papers of questions may appear too long and too heavy. This has arisen from the circumstance that the several candidates had selected very many (almost every one) of the subjects set down in the Regulations of the Institute, pp. 3 and 4. It was therefore necessary to take the widest range possible into our consideration, and to set papers on all. But we took especial care to impress upon the candidates our wish that they should pay attention more to the correctness of the answers than to the number of them; and it is hoped that the questions have drawn forth from each candidate the result of his studies, and elicited examples of the knowledge which he has been enabled to store up.

It is, however, our duty to call to your notice the fact that the time is certainly not enough for the work that ought to be performed by each candidate. We have made every allowance for this circumstance, but should strongly recommend that in future a greater number of days be allowed to each class, in order that the various subjects—more particularly those of drawing and design—may be more fully and completely worked out. The Moderators, who day by day observed the pressure on the various candidates, will probably suggest the extension of time they think desirable.

One most important circumstance we would also venture to impress on the Council, viz., that the time allotted for the Examiners to get ready the various questions has been far too short. This year there has been a double set of papers to prepare, the second set of much greater difficulty than the first, and to do this we had barely three weeks. Engaged as we all are in the active exercise of our profession, it is no exaggeration to say our work this year has been very pressing, and has not been carried through without a considerable sacrifice of valuable time. We see no reason why future Examiners could not as well be nominated early in December as in January, and would strongly urge on the Council that arrangements to effect this should be carried out. We would also suggest that fourteen days be allowed for preparing the Report, instead of seven as at present.

Taking the system as a whole, we see no need of alteration except in a few minor matters. We think that it would be desirable to empower the Examiners to separate the marks for drawing and design from those for geometrical drawing, which at present are thrown together. We think also that it should be more clearly made known that the latter branch should be treated practically as a question of drawing, and not worked out by calculations as have been done in several instances.

We also think that the number of marks allotted to the class of distinction should be much greater; at present they are but two-thirds of those of proficiency, which is apparently an anomaly. The smallness of the numbers, too, rather fetters the Examiners in allotting the marks to so wide a range of subjects as that embraced in the Class of Distinction. We beg also to suggest that the candidates in this class should be required to obtain a certain number of marks in each subject, like those in the Class of Proficiency.

We also beg to remark that in the Class of Distinction neither candidate has taken any notice of the papers set in Greek and Latin, and only one of those in French. We had understood that satisfactory answers to one of the classic papers were necessary for passing in this class. But the rules are not very clear on the subject, and we beg therefore to bring this circumstance to your notice, that you may lay it before the Council for their determination.

We must now sincerely congratulate the Institute on the progress and success of the Examination.

Although the standard has been fully maintained, and in fact a greater number of marks have been required to be obtained this year, in order that a candidate may pass, than was required last year (a circumstance which has arisen in consequence of the Council allowance being but half what it was before), yet much of the work produced has been decidedly of a higher order. The best of the designs this year have clearly been superior to those of the past, and in the branch of History and Literature, instead of a short *resumé* of a subject, each candidate has produced a regular essay or thesis. So complete and so well written are some of them, that we would venture to recommend that one or more be printed, that it may be shewn to the profession how much can be done in two hours' time, if the candidates will but earnestly apply themselves to their work. We also would recommend the exhibition of a selection of the drawings, and for the same purpose.

We think, also, that it would be a saving of time and trouble to all parties, if the recommendation made by the Moderators each year be adopted with respect to issuing blank forms of the requirements to be filled up by the candidate.

There is but one thing more that we would suggest, viz,, that it would be a very desirable thing if the Institute would arrange for a Series of Lectures to be given, practically bearing on all the points of the Examination.

We have the honor to be, Gentlemen,

Very faithfully yours,

Arthur Ashpitel, F.S.A., V.P.
Geo. Gilbert Scott, R.A.
T. Hayter Lewis, F.S.A.

REPORT OF THE MODERATORS,

(Presented to the Council, February 15th, 1864, and read at the Ordinary General Meeting the same evening.)

9, *Conduit Street*, *Hanover Square*, *W.*, *February* 13, 1864.

To the Honorary Secretaries of the
Royal Institute of British Architects.

Dear Sirs,

We beg to hand you herewith a list of the signs affixed by us to the papers and drawings prepared by the candidates in our presence, in order that, by a comparison of those signs with the number of marks allowed by the Examiners to the several papers and drawings, you may ascertain the total number of marks which each candidate has obtained.

In doing this we have, we believe, completed our duties; but we venture to think that some notes of our experience gained on this occasion may not be without value as to the course of future Examinations.

We have endeavoured, as was our duty, to conduct the Examination strictly in accordance with the rules laid down by the Institute. We have ventured however, in one instance, to make a slight technical modification, which we considered to be required by the circumstances.

According to the plan adopted last year, which appears also to be contemplated, though not actually expressed, by the rules for the conduct of the Examination, the whole of the subjects in the Class of Proficiency are divided between the six half-days allotted to that Examination; this appears in some cases to be undesirable. For instance, three hours seems an insufficient time for the subject of "Drawing and Design," given for the morning of the first day, whereas "Geometrical Drawing," the subject for the afternoon of the same day, might well be disposed of in a much shorter time. Acting on this impression, we therefore permitted the candidates to continue the work of the morning during a portion of the afternoon, the papers not being collected till the end of the day.

Having ventured to make this modification in the present instance on our own responsibility, we are induced to direct your attention to the question, whether it would not be desirable to devote rather more time in the Examination to the subjects of drawing and design?

As this has been the first Examination in the Class of Distinction, our experience leads us to direct your particular attention to the short time allowed for this course. It appears somewhat anomalous that for this more severe Examination less time should be allowed than for that in the Class of Proficiency; this appears more especially the case for the subjects of drawing and design.

As to the general arrangements for this Examination, it will be sufficient to say that they were the same as last year; and we have much pleasure in being able to report that they were satisfactorily carried out, and that the attendance and conduct of the candidates were perfectly regular and orderly.

After the close of the first day's work, the Examiners met and inspected the drawings: and we can bear testimony to the great care and patient deliberation with which, during five hours, they pursued their investigations, and continued them further for several hours at the close of the course on the last day. We considered it our duty to attend the Examiners on these occasions, to render them any assistance in our power.

At the close of each of the other days the papers of answers collected from the candidates were sealed up and sent to the Examiners, after having been marked with distinctive signs known only to ourselves, according to the system laid down in the rules for our guidance.

In conclusion, we think we may congratulate the Institute on the successful issue of the Second Course of the Voluntary Architectural Examination; and we trust the time may not be far distant when every young architect will consider it a privilege to avail himself of so valuable a test of the success of his studies.

We have the honor to be, dear Sirs,
Your obedient Servants,
Moderators, { CHARLES FOWLER, JUN.
JOHN W. PAPWORTH.

Mr. T. **HAYTER LEWIS**, Fellow (one of the Examiners), was very sorry that Mr. Ashpitel, unfortunately from being unwell, and Mr. Scott, through being out of town, had been prevented from attending this evening, for he was quite sure that both gentlemen very much regretted that they could not be present. It could scarcely have been possible to have exceeded the interest they felt in the success of the Examination and the attention they had given both to the setting the questions and to the Examinations themselves; and he felt that if those Examinations were to be carried out to the satisfaction of all parties, it could only be done by having for Examiners gentlemen who would bring to bear upon them such zeal and energy in the cause as had Mr. Ashpitel and Mr. Scott. The Examiners had expressed, in their report, their views upon these Examinations, and they had been further dwelt upon in the report of the Moderators. It was therefore scarcely necessary for him to dwell very long upon the subject. There were one or two points, however, which he should be glad to bring somewhat more prominently before the meeting. The great thing in these Examinations was, unquestionably, that the candidates should be thoroughly satisfied with regard to the questions—that there should be nothing they should call "catch" questions—nothing which it might not fairly be expected that the men should be clearly able to understand when the questions were put before them; and that the papers should bring out from the several candidates a fair average amount of knowledge on different subjects—that there should be nothing which any candidate whose mind had been directed to the necessary course of study should not be expected fairly to answer. In order to do that, the Examiners met at once with a serious difficulty. Take the case of Natural Philosophy, for instance: one gentleman wished to be examined throughout the whole course, and this heading, according to the printed regulations, comprised altogether twelve different subjects. Therefore if they had an elaborate series of papers, and asked only four or five questions on each subject, this would give forty or fifty questions, which was enough to frighten away any young student. But there was, on the other side, this further difficulty, viz., that if a sufficient number of questions were not set, the candidate might possibly have reason to complain that the very subject upon which he knew most had been to some extent neglected, and that his chance of success had been therefore by so much diminished. It was thought better, therefore, to give general questions, making them as few as the subjects would allow, but at the same time treating each subject fairly. Another thing struck his fellow-Examiners more than it did himself—and for this simple reason, that it was his first year as an Examiner, whereas it was their second—viz., the superior quality of the work done this year in comparison with that of last year. Through the great care and attention of the Moderators, the Examiners were enabled to compare the drawings made during the two years very well indeed. They had this year's drawings put in a long series from one end of the room to the other, having them arranged according to their degrees of merit, and opposite to them the Moderators kindly arranged the last year's drawings in a similar way. There could be no question that the higher drawings of this year were superior to the higher drawings of the preceding year. Of course, he could not say that the improvement extended the whole way. There would always be a certain number of young men who would come up for examination a little sooner than perhaps they ought to do, and some good draughtsmen might get a little nervous, and not do, perhaps, at a first attempt what they might be able to do at a second; and therefore they would always find, perhaps, that the lower part of the scale was pretty much the same. But the highest class—and indeed the average of the whole—was decidedly better this year than last; and his fellow-Examiners said the same thing applied all through the several papers of questions. He would mention one thing which it was necessary the candidates should know, and that was the extreme care with which the printed regulations made it secure that the Examination should be fairly conducted. Until the names of the successful candidates had been read this evening, he had not the remotest idea as to who had passed. The Examiners knew that A. so-and-so had so many marks on the first day, but then A. signified a different person on the second or third day. B. or C. might be first on the second day, and A. might be last on the third day, the actual application of the several marks being known to the Moderators only, so that really, until the Honorary Secretary announced the names, they had not the most distant notion of who had passed. As far as he was concerned, he confessed he was altogether surprised at the quality of the work, considering the time in which it was performed. He believed that the time allotted to the paper on Architectural Literature was two hours only, and really some of the papers were wonderfully good. In looking through them, he remarked that the candidates must have capital memories and clear heads to be able to give the dates and the various details of the buildings, and other particulars, so accurately as many had done. Many gave elaborate treatises on various subjects, and these were not slovenly, but exceedingly well done—so well that they (the Examiners) hoped the Meeting would allow a selection of them to be published, to show what could be done in a couple of hours. Then, with respect to the lectures suggested, when they expressed their views upon this subject, they were rather afraid of making their Report too long; but it was their opinion that if this suggestion were adopted, it would be a great satisfaction and advantage to the candidates generally, especially to those who had failed. It was suggested that these lectures would to a certain extent take as a text the questions which were put, and then having them worked up and elaborated, as it were, by men who thoroughly understood them, it would better enable those who had failed to understand exactly why they had failed, and what they ought to do in order to read up for future examination. He hoped these lectures would be agreed to by the Institute. It would, he considered, be an excellent thing to have them, and from what he heard, he believed they would be heartily welcomed.

He should quite fail in his duty on behalf of his fellow-Examiners and himself, if he did not express to the meeting the very great obligation they owed to the Moderators for the care and attention they showed throughout, and also for the great assistance they were to the Examiners in the discharge of their duties. It was the first time of his being an Examiner, and he did not know how he should have got through the work, if it had not been for the kindness of the Moderators.

And now to conclude, he wished most earnestly to express his hope that the candidates who had failed this time, and those who had not had the courage to come forward, would not feel disheartened. He had watched these things from the first, and he had the strongest hopes that these Examinations, if carried out thoroughly, would prove of the greatest service in raising the tone of the profession; and the only thing that would tend to prevent that would be from the young men being discouraged. He sincerely hoped that would not be the case. In the great struggle of life, few men could hope to push their way at once, and be successful at the first attempt. Fail you may at the outset; but if you only persevere to find where you first were wrong and determine to set that right, it will only be by some unlucky chance if you do not succeed at the second time. Let any young man who had failed, think over the questions, and he would surely find for himself pretty well *where* he had failed. He must have said at the time to himself, "I understand that question, or I do not;" and if he had failed in passing the Examination as a whole, he would be pretty sure to be able to put his hand upon that particular paper of subjects in which his failure really had occurred; and if he would only just set to work and say, "I have failed in that, and will read up for it by the next time," there was no question that he would pass. He had a fair reason for urging the unsuccessful candidates to try again. This was not a competitive examination, where one candidate may say of the others, "They have more opportunity for study than I have; other men, stronger in health and more powerful in intellect than I am, will throw me on one side and distance me in the race, and my chance is not worth the trying for." But here it is not so. Let a man read, and understand what he reads, up to a certain point, and he was sure to pass, no matter how clever and how powerful his rivals. Therefore he urged them all not to be discouraged: and he repeated that if the gentlemen who came up this time and failed, and the twenty or thirty others who, though training, did not come up at all, would carefully consider where they failed or were likely to have failed, and work accordingly, determined to succeed, their future success was certain. He believed it would very soon be regarded as a great honour to pass these Examinations, and if so, the young men who had not passed them would be considered certainly behind the mark. Therefore he hoped that next time, instead of the eighteen candidates, there would be a much greater number, and that amongst them would be all, or nearly so, of those who had failed to pass this time. The whole subject had the very best wishes of the Examiners, and he was quite sure that neither of them regretted, in the slightest degree, the time and consideration which it had cost them.

The CHAIRMAN (Mr. Owen Jones, V.P.) said, it must be a source of great gratification to them all to have heard the reports of the Examiners and Moderators, together with the observations which had fallen from Mr. Lewis. The advice which Mr. Lewis had given to the young men in the profession he certainly hoped would be followed, and that next year they might have a continuation of that progress which he had pointed out. They had a duty to perform towards the Examiners and Moderators, who had devoted an extraordinary amount of time, to the sacrifice of their own professional engagements, towards these Examinations; and it behoved those who had been idle in the cause to award them their most sincere and hearty thanks for what they had done in carrying forward this important movement, which they all cordially approved. The Chairman then proposed, "that the best thanks of the Meeting be given to the Examiners and Moderators for the care, time, and attention which they had given to the subject," which was carried by acclamation.

PROFESSOR KERR, Fellow, thought that some such recognition should be taken of these reports, as that the meeting should congratulate the gentlemen who had passed upon the distinction they had attained, and also express its entire approval and satisfaction at the manner in which the examinations had been conducted. It was necessary that such approval should be voted in consequence of the modification of the regulations, which he thought had been very properly adopted by the Examiners. No doubt the meeting would be quite ready to sanction what had been done, and that they would receive with approbation the proposal that the Institute should give a course of lectures for the benefit of those who were studying for the examinations. He could only say that so far as his services were of value, he would readily do his share, and if others would do likewise, these lectures could be carried out without much difficulty.

Mr. C. FOWLER, Jun., Fellow, returned thanks on behalf of the Moderators, for the kind vote which had been given to them for their exertions. He would like to say one word on the question with regard to more time being required for the Examination. Perhaps the Moderators were better able to judge as to this point than the Examiners. Some men might perhaps be pretty well up in a subject, but had not got it so completely at their fingers' ends that they could write it off at once. They required a little time for thought, and sufficient time scarcely seemed to be allowed at present. The candidates certainly did not lose any time, and from the way in which they worked he should think they had never before done so much work in three days. It was from these circumstances that the Moderators had thrown out the suggestion in their report.

Mr. C. F. HAYWARD, Hon. Sec., would mention that Mr. Digby Wyatt, one of the Examiners last year, was unable to accept the office of Examiner this year, not because he wished in anywise to shirk these interesting though arduous duties which he felt he was almost bound to do if asked, but because a number of gentlemen in his office and in other business relations with himself were candidates for examination; and therefore, by the rules of the Institute, as stated in the regulations of the Examinations, he could not be one of the Examiners. It was the wish of Mr. Digby Wyatt that this should be now understood, although he (Mr. H.) had taken care to inform the Institute before, at the time the Examiners were appointed. Last year the Council gave the Honorary Secretaries permission—and no doubt the same permission would be extended to them this year—to explain to those candidates whose names did not appear in the successful list, if they chose, in what way they had failed, and in what particular branches they were more successful. In doing this friendly duty last year, he found that gentlemen generally were hardly aware of the importance of their being up to a certain standard in *every* branch of the subjects set down in the papers, and that knowing one or two subjects well was not sufficient. If they were good in all subjects but one, and yet failed to give a sufficient number of answers in this one, they must fail altogether. If this were well understood it might be a source of encouragement to those who had not succeeded, for they might know they were thoroughly up in drawing in design for instance, and yet, finding they did not pass would discover that they had overlooked one or more important branches of study. It ought to be a source of congratulation to students to know there was such a body as the Examiners to find out the particular points where they failed; and for his part, he should have been only too glad if such Examinations had been instituted years ago, whereby he could have found out the failings in his architectural education which daily experience in professional practice now taught him. He might also remind them that gentlemen not being eligible as Associates or regular students of this Institute could now, if they chose, come in as *Temporary Students*, with a view of being examined next year; and it was to be hoped that the library would thus be made use of, as it was now available to every gentleman in this way.

With regard to the many applications they had received for the publication called the "Regulations of the Examinations, &c.," he would explain that there was such a large demand for them, in the form as issued, that they were soon sold out; and as the next Examination was so near, the Council did not think it worth while to have them republished till after the present examination. They would now be revised and issued in the form of a small volume, as before, with the new papers of questions added; and within the next few weeks, gentlemen who applied would be able to get copies.

Referring to the desirability of special lectures, as had been suggested, he said he was delighted to hear the remarks that had been made on the subject, and he hoped they would enable the Council to carry out the suggestion. Other volunteers should follow the good example set by Professor Kerr in promising his active assistance. If gentlemen would be kind enough to inform them (the Honorary Secretaries) on what subject bearing upon the particular class of subjects embraced in the Examinations they would lecture, they would gladly avail themselves of the offer, and would make it their duty to arrange for as many lectures as possible on the "off-nights" of the session. He presumed these lectures would be entirely confined to the subjects necessary for the Examination.

Now the *Distinction* Examinations were opened, he trusted, instead of having two candidates for examination at a time, there would be a large increase next year in this particular class, as well as in the other. According to the analysis he held in his hand, which was prepared similar to that of last year, it was very evident that the Distinction candidates were well up to their work, inasmuch as the total full standard number of marks required to be obtained was 5,000, and the total number actually obtained was considerably more than 2,000 above this—taking no notice whatever of the allowance of marks permitted by the Council for this year. Of course, the exact number was not to be made known: but it was satisfactory that so many had been obtained beyond the necessary number in this the first Examination of the kind.

PROFESSOR KERR thought he might direct attention to another subject. He understood that a somewhat important matter had occurred since the last meeting of the Institute in respect to their Scale of Charges. He believed those charges had been several times recognised in law proceedings, but in a trial which occurred the other day they were recognised more completely; and as he understood the Council were about to have the scale reprinted and circulated, it would be satisfactory to know that it was now fully accepted by Her Majesty's judges as evidence of custom. Another principle which he understood was established in the trial alluded to was one which might not be so thoroughly comprehended; at the same time it was interesting, if he had the right version of the matter. It was argued that a client had a right to dismiss his architect just as he would dismiss his medical man or his lawyer (that was the exact illustration) at any time he chose, paying him for his trouble up to the time of dismissal. But Lord Chief Justice Erle held that it was not so. That a person might dismiss his medical man or his solicitor and pay him to the time of his dismissal, was undisputed; but his Lordship said an architect was employed to do certain work as a whole, and that this work was not done, his retainer was not completely fulfilled, until all was finished; so that dismissal could not be effected upon the same terms as the dismissal of a lawyer or medical attendant. This was an interesting point, and it might be important for them to understand thoroughly what his lordship meant.

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